U.S. EPA Superfund
Record of Decision

Evergreen Manor Groundwater Contamination
Roscoe Township, Winnebago County, Illinois

September, 2003

RECORD OF DECISION
EVERGREEN MANOR GROUNDWATER CONTAMINATION

SECTION 1 - DECLARATION

SECTION 2 - DECISION SUMMARY

SECTION 3 - RESPONSIVENESS SUMMARY

FIGURES

FIGURES - *Continued*

TABLES

TABLES - *Continued*

APPENDICES

SECTION 1
DECLARATION

1.1 Site Name and Location

Evergreen Manor Groundwater Contamination
Roscoe Township, Winnebago County, Illinois
CERCLIS ID Number ILD984836734

1.2 Statement of Basis and Purpose

This decision document presents the United States Environmental Protection Agency's (EPA's) selected remedy for the Evergreen Manor Groundwater Contamination site (Evergreen Manor site) in Roscoe Township in Winnebago County, Illinois. EPA developed this selected remedy in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, 42 U.S.C. §§ 9601-9675. The selected remedy is consistent with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 C.F.R. Part 300, to the extent practicable. This decision is based on the Administrative Record file for this site.

The State of Illinois indicated that it is willing to concur with EPA's selection of Alternative 3 - Monitored Natural Attenuation as the remedy for the Evergreen Manor site at this time. When EPA receives the state's letter of concurrence, it will be attached to this ROD as Appendix J.

1.3 Assessment of the Site

The response action selected in this ROD is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

1.4 Description of the Selected Remedy

This ROD addresses the remaining groundwater contamination at the Evergreen Manor site. In 1999-2000, EPA connected 281 homes with contaminated and threatened well supplies to the North Park Public Water District (NPPWD) as a Non-Time-Critical Removal Action. The NPPWD obtains most of its water from four wells located three to four miles south of the Evergreen Manor site that are not in danger of becoming contaminated by the site. Contaminants have been found in two very deep standby wells (450 to 780 feet deep) operated by the NPPWD about 0.25 mile east of the site. Sampling indicates that this contamination is most likely coming from a contaminated coating found on the well pipes. At this time, EPA does not consider the contamination in the standby wells to be site-related. The standby wells are not in use and the contamination is being addressed through EPA's Safe Drinking Water Program. There may be as many as 73 private wells still in use in areas within or adjacent to the groundwater contamination. However, based on groundwater sampling from 1990 to 2002, EPA expects that the private wells are not contaminated or have low levels of contamination below drinking water standards.

This ROD addresses the remaining groundwater contamination at the Evergreen Manor site using natural processes, local groundwater use controls, monitoring and contingency actions to eliminate or reduce the risks posed by the groundwater. This ROD also ensures that potential risks from site-related vapors remain below acceptable levels.

The major components of the selected remedy include:

- Natural attenuation to restore the groundwater to maximum contaminant levels (MCLs) and Illinois Primary Drinking Water Standards (35 IAC Part 611) for trichloroethene (TCE), tetrachloroethene (PCE) and other site-related chemicals. Based on EPA's investigations, the following chemicals may also be site-related and may be present in the groundwater above risk-based levels: benzene, ethyl benzene, toluene, xylenes, acetone, methylene chloride, Freon 113 (1,1,2-trichloro-1,2,2-trifluoroethane), 2-butanone (methy ethyl ketone), 1,1,1-trichloroethane, cis-1,2-dichloroethene and other breakdown products of TCE and PCE. Based on the potential for exposure to multiple contaminants in the groundwater, the total excess lifetime risks from exposure to groundwater will also be reduced to 1 x 10-4 or less for carcinogenic risks and a hazard index of less than 1.0 for noncancer risks. The primary attenuation processes at the Evergreen Manor site are stream capture and dilution, with dispersion, advection and some biodegradation occurring within the plume. The estimated cleanup time frame is approximately 12 years. As the levels of contaminants in the groundwater decrease, any site-related contaminants in the soil vapors and in area homes are also expected to decrease.

- Local government controls to limit the use of contaminated groundwater as a water supply until the cleanup is complete. Winnebago County has two ordinances that accomplish this (Winnebago County Code Article III, November 1999). Section 86-111 of the code requires all properties within 200 feet of a public water supply to connect to the water supply instead of drilling a well. The areas where groundwater contaminants are still above drinking water standards are serviced by the North Park water supply so EPA does not expect any new wells to be permitted in these areas.

  In areas where municipal water is not available and where it is uncertain whether groundwater contaminants are still above drinking water levels, Section 86-114 of the code applies. This section of the code requires property owners to obtain a well permit for a new well or for well repairs. On the permit, the county can notify the applicant that the well is located in a contaminated area and can recommend that the well be sampled for contaminants. If contaminants are detected, the county can recommend that a home treatment unit be installed. The county can also recommend that new and redrilled wells be installed below the zone of contamination so that only clean water comes into the wells; and can notify EPA when a new permit is issued in the area.

- Groundwater and residential well monitoring to track the progress of natural attenuation over time and to verify that the remedy remains protective of human health and the environment until the cleanup levels are attained. The monitoring will also verify that the contaminated groundwater is not impacting the Rock River as the groundwater discharges into the river. The monitoring program will

identify any changes in land and groundwater use and changes in groundwater conditions that could affect the performance or the protectiveness of the remedy.

- Vapor monitoring at a statistically significant number of homes (approximately 25 homes) throughout the area four times a year (winter, spring, summer and fall) to verify that potential risks from site-related vapors remain below a total excess lifetime cancer risk of 1 x 10-4 and a noncancer hazard index of 1.0. Vapor monitoring will be conducted over a one- to two-year period. After the first year, the results of the sampling will be reviewed and the monitoring program may be modified to add or remove homes from the program. It is anticipated that vapor monitoring will include soil gas, indoor air, soil and shallow groundwater sampling. Vapor monitoring will continue until it is clear that site-related soil vapors will remain below acceptable levels.

- Contingency actions will be implemented if monitoring identifies the need for modifications or changes in the remedy. Contingency actions include: Confirmation sampling; collecting samples more frequently; contaminant fate and transport modeling; human health and ecological risk assessment; collecting surface water and/or sediment samples from the Rock River; temporary well point sampling/vertical profiling or other characterization activities; installing new monitoring wells; adding locations to the vapor monitoring program or modifying the vapor monitoring program; adding private wells to the groundwater monitoring program; notifying the Winnebago County Health Department of changes in the extent of the contaminated groundwater plume and of changes in chemical concentrations within the plume; installing venting systems at homes where site-related vapors do not remain below acceptable levels; conducting a source area investigation; evaluating whether additional response actions, such as constructing a groundwater pump and treat system, installing treatment units at individual private wells, connecting additional homes to the NPPWD, or remediating source area(s) are necessary; and implementing additional response actions.

1.5 Statutory Determinations

The selected remedy is protective of human health and the environment, complies with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost effective. The selected remedy utilizes permanent solutions and alternative treatment or resource recovery technologies to the maximum extent practicable.

The selected remedy does not satisfy the statutory preference for treatment as a principal element of the remedy. This ROD addresses a large area of remaining low-level groundwater contamination from industrial sources that were addressed under state oversight and/or private actions from the 1970s to the 1990s. The generally low levels of contaminants found in the industrial area and the significant decreases in groundwater concentrations from 1990 to 2002 indicate that the sources of the groundwater contamination have been addressed and that no further action is needed to investigate and/or address these source areas at this time.

Because this remedy will result in hazardous substances remaining in the groundwater above levels that allow for unlimited use and unrestricted exposure, EPA will conduct a

review within five years after the initiation of the remedial action to ensure that the remedy continues to provide adequate protection to human health and the environment.

EPA has determined that its future response at this site does not require physical construction. EPA will prepare a Preliminary Close-Out Report and the site will qualify for inclusion on the Construction Completion List.

1.6 ROD Data Certification Checklist

The Decision Summary section of this ROD includes the following information. Additional information can be found in the Administrative Record file for this site.

- Chemicals of concern and their respective concentrations - *Page 2-6.*
- Baseline risks represented by the chemicals of concern - *Page 2-10.*
- Cleanup levels established for chemicals of concern and the basis for the levels - Page *2-30.*
- Current and reasonably anticipated future land and groundwater use assumptions used in the baseline risk assessment and streamlined risk evaluations - *Page 2-9.*
- Industrial sources of the groundwater contamination that were addressed under State oversight and/or private actions - *Page 2-2.*
- Land and groundwater use that will be available at the site as a result of the selected remedy - *Page 2-34.*
- Estimated capital, annual operation and maintenance (O&M), and total present worth costs; discount rate; and the number of years over which the remedy cost estimates are projected - *Page 2-34.*
- Key factors that led to selecting the remedy (i.e., describes how the selected remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria, and highlights criteria key to the decision) - *Page 2-29.*

1.7 AUTHORIZING SIGNATURE

9/30/03
Date

Wm. E. Muno
William E. Muno
Superfund Division Director

SECTION 2
DECISION SUMMARY

2.1 SITE NAME, LOCATION AND DESCRIPTION

The Evergreen Manor site is an area of groundwater contamination in unincorporated Roscoe Township in Winnebago County, Illinois, just north of Roscoe, Illinois (Figure 1). Roscoe is in north-central Illinois about 10 miles north of Rockford, Illinois. The CERCLIS identification number for the site is ILD984836734.

The groundwater contamination is in the upper sand and gravel aquifer and is located from the water table down to about 100 feet below ground. The contamination extends from an industrial area near Route 251 and Rockton Road about 2 miles southwest through the Hononegah Heights, Tresemer, Old Farm and Evergreen Manor subdivisions. Between the industrial area and the residential area is about 1 mile of open farmland. After passing through the subdivisions the groundwater flows into the Rock River.

The majority of the homes in the residential area are connected to the public water supply. There may be as many as 73 private wells still in use in areas within or adjacent to the groundwater contamination. However, based on EPA's 2000-2002 investigations, most of the groundwater contamination has already naturally attenuated to below drinking water standards.

EPA is the lead agency at the site and is conducting activities using funds from the Superfund trust fund. The Illinois Environmental Protection Agency (IEPA) is the support agency and provides EPA with state support and assistance.

2.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES

2.2.1 Previous Investigations

The groundwater contamination was discovered in 1990 when a mortgage company required a homeowner to sample their well. The sample contained elevated levels of volatile organic chemicals (VOCs). Between 1990 and 1994 the Illinois Department of Public Health (IDPH) and IEPA sampled 267 residential wells. Two hundred and three homes had contaminated well water. At 108 homes, the water was contaminated above drinking water standards.

The IEPA investigated further. In 1992, IEPA collected samples of soil vapors and groundwater from several locations throughout the area. The sampling traced the groundwater contamination to an industrial area about 1 mile northeast of the subdivisions. IEPA also determined that the Evergreen Manor groundwater contamination was not connected to the Warner Electric groundwater contamination, which is being addressed under the Resource Conservation and Recovery Act (RCRA).

Between 1993 and 1995 IEPA collected more residential well samples and installed and sampled 24 groundwater monitoring wells. The monitoring wells were installed in

the industrial area northeast of the subdivisions and in the area between the industrial area and the subdivisions.

The sampling showed that the groundwater was contaminated with 2 main chemicals: trichloroethene (TCE) and tetrachloroethene (PCE). Both chemicals are solvents used to degrease metal parts and/or fabric. The maximum concentration of TCE was 91 ug/l in 1991 in a residential well located near Blue Spruce Drive and Straw Lane. The maximum concentration of PCE was 40 ug/l in 1994-1995 in groundwater monitoring well MW-103S in the industrial area (Figures 2 and 3).

The sampling results linked the groundwater contamination to former waste disposal areas at three companies located near Route 251 and Rockton Road:

- A landfill at former AAA Disposal that was covered with soil and granted closure by IEPA in 1977. In the late 1980s or early 1990s, Waste Management purchased the property for use as a transfer station. In 1990, Waste Management also excavated 1,380 cubic yards of material from the property for off-site disposal. Soil samples collected from the property contained low levels of TCE (13 ug/kg), 1,1-dichloroethane (8 ug/kg), cis-1,2-dichloroethene (15 ug/kg) and PCE (6.8 ug/kg); and higher levels of benzene (1,000 ug/kg), toluene (940 ug/kg) and xylene (7,300 ug/kg). Samples Waste Management collected from a nearby property also contained PCE at 40 ug/kg.

- Wastewater discharged to a septic field and 5 underground storage tanks at Regal-Beloit which were closed under the IEPA RCRA program in 1987. Soil samples collected from the Regal Beloit property contained low levels of TCE (7 ug/kg) and 1,1,1-trichloroethane (2 ug/kg).

- A wastewater lagoon at Ecolab that was removed under IEPA oversight in 1979. Groundwater monitoring well MW-103, which is immediately downgradient of Ecolab, had the highest concentrations of PCE (40 ug/L) and 1,1,1-trichloroethane (16 ug/L) detected at the site.

IEPA completed a Screening Site Inspection Report for the site in 1992 and an Expanded Site Investigation Report in 1994. In 1997, IEPA prepared a Hazard Ranking System Scoring Package. On July 28, 1998, EPA proposed the site on the National Priorities List (NPL).

2.2.2 Municipal Water Hook-Up

In 1998 EPA completed an Engineering Evaluation/Cost Analysis (EE/CA) to evaluate options to address the contaminated drinking water supplies. In March 1999, EPA issued an Action Memorandum for a Non-Time Critical Removal Action (NTCRA) to connect 281 residences with contaminated and threatened well supplies to the North Park Public Water District (NPPWD).

In May 1999, three potentially responsible parties (PRPs) for the site: Waste Management, Regal-Beloit and Ecolab, signed an Administrative Order on Consent (AOC) to pay $2.1 million to EPA fund the NTCRA. EPA completed the municipal water hook-up in 1999 to 2000 (Figure 4). The private wells at the homes that were connected to the municipal water supply were permanently sealed and can no longer be used.

2.2.3 Remedial Investigation and Feasibility Study

In 2000 EPA began a federal fund-lead Remedial Investigation and Feasibility Study (RI/FS) at the site to evaluate the remaining groundwater contamination and develop potential cleanup options. EPA conducted the majority of the RI fieldwork in 2000. In 2002 EPA conducted additional sampling at the site and performed a vapor intrusion investigation. The purpose of the vapor intrusion investigation was to evaluate whether groundwater contaminants were migrating into soil gas and indoor air in homes above the groundwater contamination, and whether this pathway could pose a potential risk.

2.3 COMMUNITY PARTICIPATION

2.3.1 Administrative Record

EPA maintains an Administrative Record file and an information repository for site documents at the North Suburban - Roscoe Branch Public Library, 5562 Clayton Circle, Roscoe, Illinois. EPA also maintains an Administrative Record file for the site at the EPA Region 5 Superfund Division Records Center, 77 W. Jackson, Chicago, Illinois. The public can access all major site-related documents at these repositories including:

- 1992 Screening Site Inspection Report
- 1994 Expanded Site Investigation Report
- 1997 Hazard Ranking System Scoring Package
- 1998 EE/CA
- 1999 Action Memorandum for the NTCRA
- 1999 AOC
- 2001 RI Report
- 2003 Groundwater Data Evaluation Report
- 2003 Air Sampling Report
- 2003 FS Report

A complete index of all the documents in the Administrative Record file is included in Appendix A of this ROD. An electronic copy of the documents in the Administrative Record file may also be requested from the Region 5 Superfund Division Records Center in computer disc (CD) format.

2.3.2 Public Announcements, Fact Sheets, Comment Period and Meetings

On July 25, 2003 EPA ran an advertisement in the Rockford Register Star newspaper announcing its proposed cleanup plan for the Evergreen Manor site and inviting the public to comment on its plan. The advertisement included information about EPA's proposed plan, the other alternatives that EPA considered, the upcoming availability session and public meeting, and the public comment period.

Starting on July 29, 2003, EPA announced and included links to a copy of the Evergreen Manor Proposed Plan on the EPA Region 5 Home Page on the internet. The EPA Region 5 Home Page also advertised the public comment period for the site. On August 7, 2003 EPA also issued a press release announcing EPA's proposed plan, the public comment period and the public meeting for the site. On July 22, 2003, EPA also mailed over 400 copies of its Proposed Plan to local residents and other interested parties.

On August 19, 2003, EPA held an afternoon availability session and an evening public meeting in Roscoe. At the availability session, EPA and IEPA spoke with area residents and other interested parties about the Evergreen Manor site one-on-one and answered questions. At the public meeting, EPA presented its proposed plan for the site to the community and answered questions about the site and the other cleanup alternatives EPA considered. EPA also accepted oral comments on the proposed plan at the public meeting. EPA also used the availability session and the public meeting to solicit input from a wider cross-section of the community on the current and potential future use of land and groundwater in the area.

The meetings were attended by approximately 20 people. The people who attended included representatives of IEPA and the Winnebago County Health Department, 3 newspaper reporters, 2 local television news reporters, 2 relators, 2 real estate developers, about 10 residents, and an engineering representative of Waste Management and Ecolab.

The initial public comment period was from July 28 to August 26, 2003. On August 18, 2003, Waste Management and Ecolab requested a 30-day extension in the public comment period. Based on this request, EPA extended the comment period to September 25, 2003. EPA announced the 30-day extension in the comment period in an advertisement published in the Rockford Register Star on September 3, 2003. EPA also updated the public comment period information for the site on the EPA Region 5 Homepage.

A summary of the comments that EPA received during the public comment period and EPA's responses to these comments are in the Responsiveness Summary section of this ROD, in Section 3.

2.4 SCOPE AND ROLE OF OPERABLE UNIT

This ROD addresses the remaining groundwater contamination at the site. In 1999 and 2000, EPA connected 281 homes with contaminated and threatened well supplies at the site to the municipal water system as part of a NTCRA. The private wells at the connected homes were permanently sealed and can no longer be used.

Records and sampling data indicate that the sources of the groundwater contamination have been addressed under state oversight and/or private actions. EPA does not believe that any further action is needed to investigate and/or address these source areas at this time.

EPA's 2000 and 2002 groundwater sampling shows that TCE and PCE are still present in the groundwater above the federal maximum contaminant levels (MCLs) for drinking water, as specified in the Safe Drinking Water Act, 42 U.S.C. §§ 300f-300j-11. Using EPA's currently recommended carcinogenic toxicity values for TCE and PCE, the remaining concentrations of TCE and PCE correspond to an excess lifetime cancer risk of 2 x 10-4. This risk is slightly above EPA's generally acceptable risk range of 1 x 10-4 to 1 x 10-6.

Low levels of benzene, ethyl benzene, toluene, xylenes, acetone, methylene chloride, Freon 113 (1,1,2-trichloro-1,2,2-trifluoroethane), 2-butanone (methy ethyl ketone), 1,1,1-trichloroethane (1,1,1-TCA), cis-1,2-dichloroethene (cis-1,2-DCE), 1,1-

dichloroethene (1,1-DCE) and 1,1-dichloroethane (1,1-DCA) were also detected in the groundwater. TCE, PCE and the other groundwater contaminants (except for cis-1,2-DCE, 1,1-DCE and 1,1-DCA) were also found in soil gas samples collected from homes above the area of groundwater contamination.

The cancer risk from site-related chemicals in indoor air and soil gas at the 4 homes EPA sampled does not exceed a cancer risk of 1 x 10-4 or a noncancer hazard index of 1.0. Vapor monitoring conducted as part of the selected remedy will verify that the potential risks from the vapor intrusion pathway remain within acceptable levels.

This remedy will be EPA's final response action for the Evergreen Manor site.

2.5 CURRENT SITE CONDITIONS

2.5.1 Site Investigations

EPA conducted a RI at the site in 2000. In 2002, EPA conducted additional groundwater, surface water and sediment sampling at the site, and a vapor intrusion investigation.

The 2000 RI included a series of field investigations to collect information to characterize the nature and extent of the remaining groundwater contamination at the site and to evaluate the associated risks. The RI included:

- Vertically profiling the groundwater at temporary well points in various areas of the site using a cone penetrometer;
- Groundwater sampling at monitoring wells;
- Residential well sampling at available residential wells;
- Surface water and sediment sampling in Dry Creek and the Rock River; and
- Groundwater and surface water elevation measurements.

During the RI EPA also reviewed background reports and other published documents to collect information about surface features, meteorology, geology, hydrogeology, hydrology, area ecology, land and groundwater use and demography. The results of RI are presented in the 2001 RI Report.

In 2002, EPA conducted additional investigations at the site. These investigations involved:

- Installing 3 new groundwater monitoring wells at the site to replace 2 residential wells that were abandoned during the NTCRA and a temporary well point location sampled during the RI;
- Additional groundwater sampling at selected groundwater monitoring wells;
- Additional surface water and sediment sampling in the Rock River;
- Additional groundwater and surface water elevation measurements;
- Collecting 24-hour soil gas samples from the foundation elevation at 4 locations around the perimeter of 4 homes in the residential area;
- Collecting 24-hour indoor air samples from the basement and on the 1st floor of 4 homes in the residential area;
- Collecting a 24-hour ambient air sample near one of the 4 sampled homes.

A comprehensive discussion and evaluation of the groundwater contamination at the site from 1990 to 2002, including potential impacts to surface water and sediment, can be found in the 2003 Groundwater Data Evaluation Report. The results of EPA's vapor intrusion investigation are presented in the 2003 Air Sampling Report.

2.5.2 General Site Conditions

The Evergreen Manor site is a large area of low-level groundwater contamination that extends from an industrial area near Route 251 and Rockton Road about 2 miles southwest through the Hononegah Heights, Tresemer, Old Farm and Evergreen Manor subdivisions (Figure 1). At its widest point the groundwater contamination is about ½ mile wide. Between the industrial area and the residential area is about 1 mile of open farmland. Dry Creek runs through the farmland and transects the plume. Groundwater and surface water elevations indicate that the groundwater does not discharge to Dry Creek.

After passing through the subdivisions the groundwater flows into the Rock River. The Rock River is a major river and a principal area for regional groundwater discharge. The average daily discharge of the Rock River near the site is 4,178 cubic feet per second (cfs).

The groundwater contamination is in an unconfined, unconsolidated upper sand and gravel outwash aquifer and is located from the water table down to about 100 feet below ground surface (ft-bgs). The water table ranges from about 40 ft-bgs near the industrial area to about 25 to 30 ft-bgs in the residential area. The sand and gravel aquifer extends down to about 250 ft-bgs and overlies the St. Peter Sandstone. Soil in the unsaturated zone is composed of sand with up to 40 percent gravel.

The upper sand and gravel aquifer has an estimated average hydraulic conductivity of 3.9 x 10-2 centimeters/second and an estimated hydraulic gradient of 0.0015 ft/ft. Using an effective porosity of 30 percent for sand and gravel aquifers, the average linear groundwater flow velocity is approximately 0.54 ft/day. Groundwater elevation data collected from pairs of shallow and deep wells indicate that the groundwater flow direction is predominantly horizontal.

2.5.3 Contaminant Concentrations

A summary of the chemical concentrations EPA detected in 2000 and 2002 residential well, groundwater, soil gas, indoor air, surface water and sediment samples is shown in Tables 1-a to 1-c.

The primary groundwater contaminants at the site are TCE and PCE. Although the horizontal and vertical limitations of the 2000 and 2002 sampling points lend some uncertainty as to the extent and concentrations of the remaining groundwater contaminants at the site, an evaluation of groundwater data at available same-sampled locations shows significant decreases in TCE and PCE concentrations over time:

- MW-103S, which had the highest PCE concentration ever detected at the site. PCE decreased from 40 ug/l in 1994-1995, to 9 ug/l in 2000 and 5.9 ug/l in 2002.
- A residential well near Blue Spruce Drive and Straw Lane, which had the highest TCE concentration ever detected at the site. TCE decreased from 91 ug/l in

September 1991, to 38 ug/l in 1993, to 26 ug/l in 1995 and 22 ug/l in 1996. This well was abandoned during the NTCRA and could not be sampled during the RI.

- MW-105D, which had the highest TCE concentration ever detected in any of the groundwater monitoring wells. TCE decreased from 15 ug/l in 1994-1995 to 3 ug/l in 2000 and 2.8 ug/l in 2002.

- 2 other residential wells near Blue Spruce Drive and Straw Lane. TCE decreased from 38 ug/l in 1990 to 6 ug/l and 4 ug/l by 2000 when these wells were sampled prior to being abandoned.

Based on EPA's 2000 and 2002 investigations, groundwater contaminants only slightly exceed MCLs at three locations (Figures 5 and 6):

- MW-103 near Ecolab, in the upgradient area of the groundwater contamination, where PCE was present in the groundwater at 9 ug/l in 2000 and at 5.9 ug/l in 2002.

- A residential well near Blue Spruce Drive and Straw Lane, where TCE was found at 6 ug/l in 2000. Because this well was abandoned as part of the NTCRA, it could not be sampled in 2002. However, groundwater sampling in monitoring well MW-1 which was installed near this residential well at the same general depth showed TCE at 4.7 ug/l, just below the MCL, in 2002.

- MW-3, at the downgradient end of the groundwater contamination, near Wagon Lane and Tanawingo, showed TCE at 7.2 ug/l in 2002.

EPA's BIOSCREEN groundwater modeling indicates that under natural conditions, TCE concentrations will decrease to below the MCL in about 3 years (2006), and PCE concentrations will decrease to below the MCL in about 12 years (2015). Other modeling EPA conducted based on natural decay following first-order kinetics indicates that TCE could decrease to below the MCL in as little as 1.5 years, and PCE could decrease to below the MCL in only 3 years. For the purposes of the FS and this ROD, EPA is conservatively assuming that it would take about 12 years for the groundwater contaminants to attain MCLs under natural conditions.

The primary attenuation processes at the Evergreen Manor site are stream capture and dilution, with dispersion, advection and some biodegradation occurring within the plume. A copy of the groundwater modeling is included in Appendix B of this ROD.

EPA also found low levels of other chemicals in the groundwater at the site. These chemicals are benzene, ethyl benzene, toluene, xylenes, acetone, methylene chloride, 2-butanone, Freon 113, 1,1,1-TCA, cis-1,2-DCE, 1,1-DCE and 1,1-DCA.

TCE, PCE and the other groundwater contaminants (except 1,2-DCE, 1,1-DCE and 1,1-DCA) were found in the soil gas and indoor air samples EPA collected from the 4 homes above the groundwater contamination. Because some of the contaminants were detected at higher concentrations in the homes than in the soil gas, some of the indoor air contamination appears to be household-related, not from the site. Also, because it is uncertain what chemicals are in the groundwater at and near the water table in the residential area, and what the remaining chemical concentrations are, it is unclear whether all of the chemicals found in the soil gas and indoor air are from the

groundwater or if they are from other sources such as septic systems. However, prior to the municipal well-hookup in 1999-2000, household water discharged to septic systems was obtained from residential wells that drew water from the contaminated Evergreen Manor plume addressed in this ROD.

Low levels of toluene, 2-butanone and Freon 113 were detected in sediment samples collected within or just downstream of the approximate groundwater discharge zone into the Rock River. None of the groundwater contaminants were detected in any of the surface water samples EPA collected from the Rock River.

TCE, PCE, benzene, ethyl benzene and methylene chloride have the potential to cause cancer and other noncancer health affects. Toluene, xylenes, acetone, 2-butanone, Freon 113, 111-TCA, cis-1,2-DCE, 1,1-DCA and 1,1-DCE are noncarcinogens and can cause adverse health effects other than cancer.

2.5.4 Chloroform

During the 2000 and 2002 investigations, EPA detected chloroform at low levels in a residential well that is now sealed (0.9 ug/l) and in a groundwater monitoring well (0.23 ug/l) EPA installed to replace the sealed residential well. EPA did not detect chloroform in any of the other 130 groundwater samples collected from the site. Because chloroform was only detected in groundwater at one location in the residential area, and was not detected in any other groundwater samples, it appears that the chloroform is not site-related. The detection of chloroform in the replacement well is also suspect because chloroform was also detected in EPA's quality control samples. This means that the chloroform detected in this sample could be from laboratory contamination - not the groundwater.

EPA's soil vapor and indoor air sampling indicates that the chloroform in the groundwater could be from chlorine laundry and cleaning products discharged into septic systems, or from chlorine bleach or tables that may have been used to disinfect private wells. Chloroform is also found in most public water supplies as a by-product of chlorination and has been found in the in the Roscoe water supply at concentrations as high as 12 ug/l (Appendix C). Residents in the area are connected to the public water supply and are serviced by septic systems.

2.5.5 Conceptual Site Model

Industrial waste disposal activities near Route 251 and Rockton Road contaminated the soil with volatile organic compounds. As wastewater and rainwater infiltrated through the soil, the contaminants washed into the groundwater. Once in the groundwater, the contaminants flow with the groundwater until they reach the residential area. The groundwater contaminants flow underneath the residential area and then discharge into the Rock River.

Along the way, some of the groundwater contaminants break down into other chemicals, and some of the groundwater contaminants can volatilize and move up through the soil. Once in the soil, the volatilized groundwater contaminants can vent into the air or can migrate directly into nearby homes and buildings. In the Rock River, the contaminants may attach to sediments in the river, flow along with the river water, or volatilize into the air and become dispersed.

Potential receptors of the groundwater contaminants are mainly residents who live above and near the area of groundwater contamination who may be exposed to groundwater contaminants that can volatilize from the groundwater and move up through the soil and into homes. Other potential receptors include residents who may use the contaminated groundwater as a water supply. These people would be exposed to groundwater contaminants through ingestion or via inhalation and dermal contact while showering. Other potential receptors include people who may wade or fish in the Rock River and terrestrial and aquatic biota that may be exposed to the groundwater contaminants venting to the Rock River. Potential exposure routes under this scenario include ingestion and dermal contact with the surface water and sediments in the Rock River and the ingestion of fish from the Rock River.

2.6. CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

2.6.1 Land Uses

The 2-mile area of groundwater contamination at the Evergreen Manor site flows under industrial, agricultural and residential areas (Figure 1). Near Route 251 and Rockton Road, and east of Route 251 south of Rockton Road, the land use is industrial, with agricultural areas to the east. On McCurry Road, west of Route 251 is a sand and gravel quarry. Also on McCurry Road, east of Route 251, is Warner Electric. West of Route 251, between Rockton Road and to just south of McCurry, the land is agricultural. South of McCurry, down to the Rock River, the land use is residential, with some agricultural areas. Other residential areas are along Degroff Road, east of Route 251 and just north of McCurry Road; and north of McCurry Road, west of the agricultural area.

Land use on the other side of the Rock River is agricultural, with residential areas to the southwest.

Based on the growth and development in the area, EPA reasonably anticipates that areas within the site that are currently agricultural could be developed for industrial and/or residential use in the future.

2.6.2 Groundwater Uses

Two hundred and eighty one residents with contaminated and threatened well supplies in the Evergreen Manor, Hononegah Heights, Tresemer and Old Farm subdivisions were connected to the NPPWD. Residents affected by the Warner Electric groundwater contamination in the nearby Hononegah Country Estates subdivision are also connected to the NPPWD. The NPPWD obtains most of its water from four wells located three to four miles south of the Evergreen Manor site that are not in danger of becoming contaminated by the site. Contaminants have been found in two very deep standby wells (450 to 780 ft deep) operated by the NPPWD that are located about 0.25 mile east of the site. Sampling indicates that this contamination is most likely coming from a contaminated coating found on the well pipes (Appendix D). At this time, EPA does not consider the contamination in these wells to be site-related. The standby wells are not in use and the contamination is being addressed through EPA's Safe Drinking Water Program.

Other residences and properties in the site area obtain their drinking water supplies from private wells (Figure 7). Up to 73 private wells may exist in the industrial area near Route 251 and Rockton Road (9 addresses), along Rockton Road (19 addresses), along Route 251 (12 addresses), along Degroff Road (19 addresses), along McCurry Road (4 addresses) and in the residential area North of McCurry Road, west of the agricultural area (58 addresses).

About 25 of these private wells were sampled by IDPH and/or IEPA in the 1990s. Most of the wells were found to be uncontaminated, with a few showing low levels of contamination below drinking water standards. One home sampled in 1991 along Degroff Road contained TCE at a concentration of 8.6 ug/l, above the MCL of 5 ug/l. Most of the 25 wells were only sampled once. Two of the wells were sampled 2 to 3 times within a year with similar results. The well with TCE above drinking water standards was only sampled once. Although EPA expects that the remaining private wells in area are not contaminated or have low levels of contamination below drinking water standards, this has not been confirmed through recent sampling.

EPA groundwater classification guidelines indicate that the groundwater at the Evergreen Manor site is a current and potential supply of drinking water. However, EPA expects Winnebago County local ordinances to limit or restrict new wells from being installed in areas where the groundwater is not safe to use (Appendix E) . Section 86-111 of Winnebago County Code Article III, November 1999 requires all properties within 200 feet of a public water supply to connect to the water supply instead of drilling a well. The areas where groundwater contaminants are still above drinking water standards are serviced by the North Park water supply so EPA does not expect any new wells to be permitted in these areas (Figure 8).

Section 86-114 of the Winnebago County Code also requires property owners to obtain a well permit for a new well or for well repairs. On the permit, the county can notify the applicant that the well is located in a contaminated area and can recommend that the well be sampled for contaminants. If contaminants are detected, the county can recommend that a home treatment unit be installed. The county can also recommend that new and redrilled wells be installed below the zone of contamination so that only clean water comes into the wells; and can notify EPA when a new permit is issued in the area.

2.7 RISK SUMMARY

The baseline risk assessment estimates the risks a site poses if no action is taken. It provides the basis for taking an action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. The risks at the Evergreen Manor site were evaluated by EPA in the Risk Assessment in the 2001 RI Report and in updated, streamlined risk evaluations in the 2003 Groundwater Data Evaluation Report and the 2003 Air Sampling Report. EPA performed the updated, streamlined risk evaluations to evaluate the risks associated with groundwater and sediment contamination under current conditions, and to evaluate potential risks associated with the vapor intrusion pathway.

2.7.1 Risks to Human Health

The 2001 Risk Assessment evaluated risks associated with the ingestion, inhalation and dermal contact with groundwater for adults and children under a residential

exposure scenario. The 2003 Streamlined Risk Evaluation evaluated risks to a combined child/adult resident (6 years as a child and 24 years as an adult) from site-related vapors found in indoor air and soil gas of homes above the groundwater contamination. Potential risks associated with surface water and sediment were also evaluated.

Groundwater

EPA screened the maximum concentration of all chemicals detected at least once in the groundwater against IEPA's risk-based Tiered Approach to Cleanup Objectives adjusted to a cancer risk level of 1 x 10-7 and a noncancer HQ = 0.1 (Table 2). EPA did this to focus the risk assessment on chemicals most likely to pose an unacceptable risk from groundwater. EPA adjusted the IEPA risk-based values to account for exposure to multiple chemicals. EPA used the most conservative of the cancer or noncancer value as the screening value.

Because the chloroform detected in the groundwater in the residential area does not appear to be site-related, the potential risks from exposure to chloroform have not been considered.

Based on screening, the chemicals of concern in the groundwater at the site are TCE, PCE, benzene, methylene chloride and acetone. The exposure point concentrations and the cancer and non-cancer toxicity data used to evaluate the risks from exposure to groundwater in the 2000 Risk Assessment are provided in Table 3 and Tables 4-a and 4-b.

The total excess lifetime cancer risk associated with exposure to these chemicals through ingestion, inhalation and dermal contact with the groundwater under a reasonable maximum residential exposure scenario is 9.4 x 10-6 for adults and 5.5 x 10-6 for children (Table 5-a). These risks are within EPA's generally acceptable risk range of 1 x 10-4 to 1 x 10-6 (1 additional case of cancer for every 10,000 to 1 million people similarly exposed over a lifetime).

The noncancer hazard indices for the ingestion, inhalation and dermal contact with the contaminated groundwater under a residential scenario are 0.34 for adults and 0.9 for children (Table 5-b). These values indicate that the intake of chemicals would be less than the amounts expected to cause adverse health effects, and that toxic noncarcinogenic effects from exposure to groundwater are unlikely.

However, additional scientific studies and evaluations conducted since the 2001 Evergreen Manor Risk Assessment now indicate that the carcinogenic toxicity of TCE and PCE is much greater than previously indicated. Based on these studies, the EPA Superfund Health Risk Technical Support Center currently recommends that carcinogenic risks from TCE be evaluated using an upperbound oral slope factor and an upperbound inhalation slope factor of 4.1E-1 $(mg/kg\text{-}day)^{-1}$. EPA also recommends (OSWER No. 9285.7-75) that carcinogenic risks from PCE be evaluated using an oral slope factor of 5.4E-1 $(mg/kg\text{-}day)^{-1}$ and an inhalation unit risk of 5.9E-6 $(ug/m^3)^{-1}$ (Table 6-a).

Using the exposure assumptions in the 2001 Risk Assessment, the risks for TCE and PCE using the maximum concentrations detected in 2002 (7.2 ug/l for TCE, 5.9 ug/l for PCE) and the currently recommended toxicity values for these chemicals, would result

in a cancer risk of 2 x 10-4 for ingestion, inhalation and dermal contact with groundwater under an adult residential exposure scenario (Table 6-b). This risk is slightly above EPA's generally acceptable risk range of 1 x 10-4 to 1 x 10-6. EPA did not recalculate the risks for child exposure to groundwater using these toxicity values because these risks would be less than those calculated for adults.

Additionally, as discussed in Section 2.5.3 of this ROD, TCE and PCE are still present in the groundwater at concentrations above the federal maximum contaminant levels (MCLs) for drinking water, as specified in the Safe Drinking Water Act, 42 U.S.C. §§ 300f-300j-11.

Vapor Intrusion

EPA calculated potential risks from vapor intrusion at each of the 4 homes EPA sampled. EPA screened the maximum concentration of all chemicals detected at least once in the soil gas or indoor air against the lowest screening value in EPA's Final Draft Vapor Intrusion Guidance and the EPA Region 9 Preliminary Remediation Goals for cancer and noncancer risks (2002). The screening values corresponded to a cancer risk level of 1 x 10-6 and a noncancer HQ = 1.0. EPA assumed an attenuation factor of 0.1 for soil gas screening values because the subsurface soils in the residential area are sand and gravel and because EPA collected the soil gas samples at depths consistent with the bottom of each home's foundation.

EPA screened the chemicals against the screening values to focus the streamlined risk evaluation on chemicals most likely to pose a risk through vapor intrusion. However, all site-related chemicals were included in the final risk calculations. As discussed in Section 2.5.4, the chloroform found in the soil gas and indoor air samples of the homes appears to be household- related, and EPA did not include chloroform results in the final risk calculations.

Based on screening, TCE, PCE, benzene, ethyl benzene and methylene chloride are the main chemicals of concern for the vapor intrusion pathway. However, at some of the homes, the majority of benzene, ethyl benzene and methylene chloride appears to be household related. EPA determined this by comparing contaminant concentrations in soil gas to contaminant concentrations in the basement and on the first floor of each home, and considering other factors about the home (Tables 7-a to 7-d). At the homes where the majority of these chemicals appears to be household related, EPA did not include these chemicals in the indoor air risk calculations for those homes. Because these chemicals were detected in groundwater at the site, EPA still included them in the soil gas risk calculations.

At other homes, it appears as if some of the PCE, benzene and ethyl benzene found in the homes is household-related and some of these chemicals are site-related. At those homes, EPA included these chemicals in the risk calculations. However, at one home (Home B) where some of the benzene and ethyl benzene (as well as toluene and xylene) in the home appeared to be coming from the first floor garage and some appeared to be coming up through the soil gas, EPA based the risk calculations for that home on the basement concentrations of those chemicals.

EPA calculated the total site-related cancer and noncancer risks for each home using the maximum concentrations EPA detected in soil vapor and indoor air (basement or first floor), then back-calculated the risk based on the lower of the EPA Vapor Intrusion

or EPA Region 9 screening values. Then EPA totaled the risks for each site-related chemical detected in each home to determine the overall site-related risk for that home (Tables 8-a and 8-b). The EPA Vapor Intrusion screening values are based on a 30-year adult exposure. The EPA Region 9 screening values are based on a combination 6 years child/24 years adult exposure.

The total excess site-related cancer risks EPA calculated for the homes ranges from 2.3 x 10-6 to 3.3 x 10-5 for indoor air and from 6.6 x 10-6 to 9.6 x 10-5 for potential risks from soil gas vapors. These risks are within EPA's generally acceptable cancer risk range of 1 x 10-4 to 1 x 10-6.

EPA did not identify any noncancer risks from site-related soil gas or indoor air vapors. The total site-related noncancer hazard indices EPA calculated for the homes (soil gas and indoor air) were all less than 1.0. The highest noncancer hazard index was 0.99. This hazard index is from the home where EPA used the basement concentrations of benzene, ethyl benzene, toluene and xylene to estimate the risks because some of these chemicals appeared to be coming from the attached garage and some may also be site-related.

Although the cancer risk from site-related chemicals in indoor air and soil gas at the 4 homes EPA sampled did not exceed a cancer risk of 1 x 10-4 or a noncancer hazard index of 1.0, continued vapor monitoring at more homes throughout the area should be conducted to ensure that potential site-related risks from the vapor intrusion pathway remain within acceptable levels.

Surface Water and Sediment

EPA did not detect any VOCs in any of the surface water samples EPA collected from the Rock River, and the surface water does not pose any current risks to human health. Based on the remaining levels of contaminants in the groundwater (e.g, TCE at a maximum concentration of 7.2 ug/l, PCE at a maximum concentration of 5.9 ug/l), and the average daily discharge of the Rock River near the site (4,178 cfs), EPA does not expect the groundwater to pose any significant risks to human health as the groundwater discharges into the Rock River.

Low levels (less than 20 ug/kg) of three groundwater contaminants - toluene, 2-butanone and Freon 113 - were detected in sediment samples collected within or just downstream of the approximate groundwater discharge zone into the Rock River. These chemical concentrations are well below the risk-based EPA Region 9 Preliminary Remediation Goals for Residential Soils and are not expected to pose any unacceptable risks to human health (Table 9).

2.7.2 Ecological Assessment

EPA did not detect any VOCs in any of the surface water samples EPA collected from the Rock River and the surface water does not pose any ecological risks.
The low levels of toluene (less than 20 ug/kg) in the sediment samples EPA collected within or just downstream of the approximate groundwater discharge zone into the Rock River are well below the lowest available EPA Ecotox Threshold and the most conservative Canadian Environmental Quality Benchmark for sediment and do not pose any ecological risks (Table 10). Toxicological data are not available to evaluate the low levels (less than 20 ug/kg) of 2-butanone and Freon 113 found in the sediment samples

collected within or just downstream of the approximate groundwater discharge zone into the Rock River. However, the Screening Ecological Assessment conducted during the RI indicates there is a negligible potential for site-related chemicals to adversely effect aquatic organisms in the Rock River.

TCE, PCE and toluene are present in groundwater above the lowest available Canadian Environmental Quality Benchmarks for surface water (but are not above EPA Ecotox Thresholds) (Table 11). Because groundwater discharges to the Rock River, these and other site-related groundwater contaminants could pose a risk to the Rock River if they moved with the groundwater and emptied into the Rock River at levels that would threaten the river.

2.7.3 Uncertainties

There are some uncertainties concerning the current horizontal and vertical extent of the Evergreen Manor groundwater contamination and the remaining contaminant concentrations within the plume. This is especially true for groundwater at and near the water table which, for the most part, has not been characterized within the residential area, but which could pose the greatest risk to residents through vapor intrusion.

The location of the center of the plume, horizontally and vertically, is also unclear. Almost all of the existing groundwater monitoring wells scattered across the 2-mile site (27 wells at 17 locations) were installed at predetermined depths and locations without the use of temporary well point transects or vertical profiling. Because only generally low levels of contaminants have been detected in the monitoring wells, it is not certain if groundwater concentrations have decreased to the extent indicated, or if the wells are located to accurately portray the plume.

Also, no data has been collected to confirm that groundwater contaminants found deeper in the aquifer close to the river (up to about 100 ft-bgs about 500 feet from the river) are not migrating under and beyond the Rock River. Similarly, no data has been collected to confirm that nearby residential wells, especially those in which contaminants were previously detected, are no longer contaminated or are contaminated below drinking water standards.

Other uncertainties exist because EPA's vapor intrusion investigation was a one-time sampling event at only 4 of almost 300 homes in the area. Property and residence-specific factors (e.g., partial basement, multiple floors, fireplaces, landscaping) can influence indoor air concentrations, and there is some uncertainty as to whether the 4 residences EPA sampled provide a reasonable characterization of vapor intrusion in all the homes in the area. Also, indoor air concentrations can be affected by seasonal variations (e.g., during the winter when homes are more tightly sealed, furnaces are running and the ground is frozen or covered by snow), and EPA's one-time sampling event may not provide an accurate assessment of longer-term average indoor levels.

Finally, without adequate groundwater data from locations at or near the water table, it is not certain that all of the contaminants EPA detected in soil gas are from the groundwater, or if they are from other sources such as septic systems. Similarly, at homes with attached garages and/or petroleum or other chemical-containing products in the home, it is not certain to what extent contaminant concentrations found in the home are household-related and which may be site-related.

2.7.4 Conclusions

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this ROD, may present a current or potential threat to public health, welfare or the environment.

2.8 REMEDIAL ACTION OBJECTIVES

EPA developed the following remedial action objectives for the site to address the risks identified in the Risk Assessment and the Streamlined Risk Evaluations. These remedial action objectives are based on current and reasonably anticipated future land and groundwater use:

1) Return the groundwater to a useable source of drinking water. This will be done by restoring the groundwater to drinking water standards for TCE, PCE and any other site-related chemicals found during Remedial Design/Remedial Action (RD/RA). Because the groundwater contains more than one contaminant, groundwater contaminants will also be reduced to concentrations that correspond to a total excess lifetime cancer risk of 1 x 10-4 and a noncancer hazard index less than 1.0. Drinking water standards and risk-based levels for site-related chemicals will be attained at all points throughout the aquifer within a reasonable time frame for the site.

2) Prevent people from using the contaminated groundwater as a source of drinking water until the groundwater is restored to drinking water standards and acceptable risk-based levels.

3) Verify that new and existing private wells are not impacted by the groundwater contamination during the groundwater cleanup.

4) Minimize the spread of groundwater contaminants.

5) Verify that potential site-related risks from the vapor intrusion pathway remain below a total excess lifetime cancer risk of 1 x 10-4 and a noncancer hazard index of 1.0.

6) Verify that TCE, PCE and any other site-related groundwater contaminants do not impact the Rock River as the groundwater flows into the river.

The federal and state drinking water standard for TCE and PCE is 5 ug/l. Additional site-related contaminants may include benzene, ethyl benzene, toluene, xylenes, acetone, methylene chloride, Freon 113, 2-butanone, 1,1,1-TCA, cis 1-2 DCE and other breakdown products of TCE and PCE. Federal drinking water standards are specified in the Safe Drinking Water Act, 42 U.S.C. §§ 300f-300j-11. State drinking water standards are provided in Illinois Primary Drinking Water Standards, 35 IAC Part 611.

Records and sampling data indicate that the sources of the groundwater contamination have been addressed under state oversight and/or private actions. As a result, EPA does not believe that any further action is needed to investigate and/or address these source areas at this time.

2.9 DESCRIPTION OF ALTERNATIVES

EPA evaluated three remedial alternatives to address the contamination at the Evergreen Manor site:

1) No Further Action
2) Groundwater Pump and Treat
3) Monitored Natural Attenuation

2.9.1 Alternative 1 - No Further Action

Remedy Components: None. The no further action alternative does not involve any cleanup action or cleanup requirements for the remaining groundwater contamination. EPA expects chemical concentrations in the groundwater to decrease over time due to the natural processes of stream capture and dilution, with dispersion, advection and limited biodegradation occurring within the plume. As the levels of groundwater contaminants decrease, EPA expects any site-related contaminants in the soil gas and in area homes to decrease.

Common Elements and Distinguishing Features: The natural processes affecting the groundwater are the same as the natural processes in Alternative 3 - Monitored Natural Attenuation. Unlike the monitored natural attenuation alternative, the no further action alternative does not include local groundwater controls to limit or restrict groundwater use, monitoring or contingency actions. Applicable or Relevant and Appropriate Requirements (ARARs) would not apply and the groundwater would not be required to attain cleanup standards or meet cleanup objectives. EPA would not be able to verify that potential site-related risks from soil vapor remain below acceptable levels. EPA cannot determine the protectiveness and long-term reliability of this alternative because this alternative does not include groundwater use controls or monitoring.

Expected Outcomes: EPA expects chemical concentrations in the groundwater would eventually decrease to drinking water levels over time. As the levels of groundwater contaminants decrease, EPA expects any site-related contaminants in soil gas and area homes to decrease. However, EPA would not be able to confirm these expected outcomes since this alternative does not include monitoring.

Without monitoring and contingency plans, some homes in the area could be exposed to site-related vapors above risk-based levels in the short-term. Without monitoring, groundwater use controls and contingency plans, private wells could be impacted, and new wells could be installed in areas where municipal water is not available and where it is uncertain if groundwater contaminants are still above drinking water levels. People could be exposed to unsafe levels of groundwater contaminants.

Estimated Capital Cost: $0
Estimated Annual Operation and Maintenance (O&M) Costs: $0
Estimated Present Worth: $0
Estimated Time to Construct: 0
Estimated Time Until Groundwater Cleaned Up to Drinking Water Levels for TCE and PCE: 12 years

Discussion: The no further action alternative does not involve any cleanup action or cleanup requirements for the groundwater, or any monitoring or contingency actions for soil vapor and indoor air. EPA expects the on-going natural processes at the Evergreen Manor site to continue to naturally reduce, or attenuate, the concentrations of TCE, PCE and any other site-related contaminants in the groundwater, and improve groundwater quality over time. However, without monitoring, this could not be verified. The primary attenuation processes affecting the groundwater at the Evergreen Manor site are stream capture and dilution, with dispersion, advection and some biodegradation occurring within the plume. As the levels of groundwater contaminants decrease, EPA expects any site-related contaminants in soil gas and area homes to decrease.

Groundwater data at available same-sampled locations from 1991 to 2002 shows significant decreases in TCE and PCE concentrations over time. TCE decreased from a maximum concentration of 91 ug/l in a residential well in 1991 to 22 ug/l when the well was resampled in 1996. PCE has also decreased from a maximum concentration of 40 ug/l in MW-103S in 1994-1995 to 5.9 ug/l in 2002. Although the horizontal and vertical limitations of the 2000 and 2002 sampling points lend some uncertainty as to the extent and concentrations of the remaining groundwater contaminants at the site, recent sampling indicates that groundwater contaminants only slightly exceed MCLs at three locations: MW-103 near Ecolab, in the upgradient area of the groundwater contamination (PCE at 5.9 ug/l); near Blue Spruce Drive and Straw Lane (TCE at 6 ug/l), and MW-3 near Wagon Lane and Tanawingo (TCE at 7.2 ug/l).

After passing through the subdivisions, most, if not all of the contaminated groundwater discharges to the Rock River, which is a major river and a principal area for regional groundwater discharge. Once in the river, the groundwater contaminants become so diluted they are harmless, and eventually break down into less toxic substances. Because the river is capturing the groundwater contamination, EPA does not expect the groundwater contamination to spread significantly, if at all, beyond the river. Sampling conducted by IDPH, IEPA and EPA from 1991 to 2002 also indicates that the plume is not getting any wider.

EPA's BIOSCREEN groundwater modeling indicates that under natural conditions, TCE concentrations will decrease to below the MCL in about 3 years (by 2006), and PCE concentrations will decrease to below the MCL in about 12 years (by 2015). Other modeling EPA conducted based on natural decay following first-order kinetics indicates that TCE could decrease to below the MCL in as little as 1.5 years, and PCE could decrease to below the MCL in only 3 years. For the purposes of the FS and this ROD, EPA is conservatively assuming that it would take about 12 years for the groundwater contaminants to attain MCLs under natural conditions.

The no further action alternative does not include monitoring, groundwater use controls or contingency plans. EPA would not be able to verify that potential site-related risks from the vapor intrusion pathway remained below acceptable levels, or that the levels of groundwater contaminants decreased to acceptable levels. EPA would not be able to confirm that private wells were not being impacted. New wells could be installed in areas where municipal water is not available and where it is uncertain whether groundwater contaminants are still above drinking water levels. People could be exposed to unsafe levels of groundwater contaminants.

The law requires EPA to evaluate a no action alternative to give the agency a basis for comparison.

2.9.2 Alternative 2 - Groundwater Pump and Treat

Remedy Components: Extraction wells, groundwater treatment unit, local groundwater use controls, monitoring and contingency actions.

Common Elements and Distinguishing Features: The groundwater pump and treat alternative uses engineered technologies to contain, extract and treat the contaminated groundwater to cleanup levels instead of relying on natural processes. Like Alternative 3 - Monitored Natural Attenuation, this alternative includes local groundwater use controls, monitoring and contingency actions. Key ARARs are:

- Safe Drinking Water Act MCLs;
- Illinois Primary Drinking Water Standards (35 IAC Part 611);
- National Pollutant Discharge Elimination System (NPDES) requirements;
- Illinois Effluent Standards (35 IAC Part 304);
- Clean Air Act requirements
- Illinois Permits and General Air Pollution Regulations (35 IAC Part 201); and
- Resource Conservation and Recovery Act (RCRA) requirements.

The engineered components of this technology, combined with groundwater use controls, monitoring and contingency actions make the short-term effectiveness and long-term reliability of this alternative high.

Expected Outcomes: EPA expects groundwater to be returned to drinking water levels in 8 years. The contaminated groundwater plume is hydraulically contained and will not discharge into the Rock River or spread into other areas. As the levels of contaminants in the groundwater decrease, EPA expects any site-related contaminants in the soil gas and in area homes to decrease. Groundwater use is limited in areas where groundwater contaminants may still be above drinking water levels. Monitoring verifies that contaminant concentrations are decreasing and that the contaminated groundwater is contained. EPA is able to verify that potential site-related risks from the vapor intrusion pathway remain below acceptable levels and that private wells are not impacted during the cleanup.

Estimated Capital Cost: $12.8 million

Estimated Annual Operation and Maintenance (O&M) Costs:
Year 1-2: $2.57 million
Year 3-5: $1.86 million
Year 6-7: $1.75 million
Year 8: $1.03 million

Estimated Present Worth: $25.1 million

Estimated Time to Construct: 6 to 12 months

Estimated Time Until Groundwater Cleaned Up to Drinking Water Levels for TCE and PCE: 8 years

NOTE: *Costs include a 25% contingency and a 7% discount rate. The actual cost of this alternative could be significantly less and would depend on the results of sampling conducted prior to designing the pump and treat system, as well as the results of the long-term monitoring.*

Discussion: The groundwater pump and treat alternative involves installing 23 groundwater extraction wells throughout the 2-mile plume to aggressively contain and remove groundwater contaminants (Figure 9). Each well would pump an estimated 500 gallons per minute. Below-ground pipes would convey the contaminated groundwater to one of three treatment buildings spaced throughout the plume. Two treatment buildings would be located along Dry Creek and one treatment building would be located along the Rock River.

In the treatment buildings, EPA would treat the groundwater using an air stripper and discharge it to Dry Creek and the Rock River. The discharges to Dry Creek and the Rock River would be required to meet the substantive requirements of a National Pollutant Discharge Elimination System permit and Illinois Effluent Standards (35 IAC Part 304). Off-gas from the air stripping towers would be required to meet the substantive requirements of the Clean Air Act and the Illinois Permits and General Air Pollution Regulations (35 IAC Part 201). Off-gas above acceptable levels would be treated using vapor phase activated carbon. The final number and the locations of the collection wells would be determined during the remedial design. EPA would manage the treatment residuals (e.g., spent carbon) and dispose them in accordance with Resource Conservation and Recovery Act (RCRA) requirements. The final details of the pump and treat system would be developed during the Remedial Design.

EPA estimates that it would take approximately 8 years (until 2011) for the pump and treat system to cleanup the groundwater to drinking water levels. As the levels of contaminants in the groundwater decrease, EPA expects any site-related contaminants in the soil gas and in area homes to decrease. Additional information about the modeling EPA used to estimate the cleanup time frames for the groundwater pump and treat alternative is provided in Section 4.2.2.1 and Appendices C and D in the FS, which are included in this ROD as Appendix F. EPA conducted the groundwater pump and treat modeling using MODFLOW, Boss GMS, Wellhead Prtection Area Delineation Software and CAPZONE groundwater models.

The groundwater pump and treat alternative also includes:

Local Groundwater Use Controls: EPA would use local government controls to limit the use of contaminated groundwater as a water supply until the cleanup is complete. Winnebago County has two ordinances that accomplish this (Winnebago County Code Article III, November 1999). Section 86-111 of the code requires all properties within 200 feet of a public water supply to connect to the water supply instead of drilling a well. The areas where groundwater contaminants are still above drinking water standards are serviced by the North Park water supply so EPA does not expect any new wells to be permitted in these areas.

In areas where municipal water is not available and where it is uncertain whether groundwater contaminants are still above drinking water levels, Section 86-114 of the code applies. This section of the code requires property owners to obtain a well permit for a new well or for well repairs. On the permit, the county can notify the applicant that the well is located in a contaminated area and can recommend that the well be sampled

for contaminants or that a home treatment unit be installed. The county can also recommend that new and redrilled wells be installed below the zone of contamination so that only clean water comes into the wells; and can notify EPA when a new permit is issued in the area.

Groundwater and Residential Well Monitoring: EPA would sample monitoring wells to verify that contaminant concentrations are decreasing and that the contaminated groundwater is contained. EPA would also sample residential wells to verify that groundwater contaminants do not impact private wells during the cleanup. EPA would also identify changes in land and groundwater use and changes in groundwater conditions that could affect the performance or the protectiveness of the remedy. This alternative assumes that EPA would sample 16 groundwater monitoring wells (10 existing wells and 6 new wells) and 10 residential wells for 8 years. Sampling would be conducted quarterly for the first 5 years, semi-annually for the next 2 years and annually the last year. The final details of the groundwater and residential well monitoring programs would be developed based on the results of pre-design investigations conducted to address the uncertainties identified in the 2003 Groundwater Data Evaluation Report (Appendix G, Section 6.4).

Vapor Monitoring: EPA would conduct vapor monitoring at a statistically significant number of homes (approximately 25 homes) throughout the area four times a year (winter, spring, summer and fall) to verify that potential site-related risks from the vapor intrusion pathway remain below a total excess lifetime cancer risk of 1 x 10-4 and a noncancer hazard index of 1.0. EPA would conduct vapor monitoring over a one- to two-year period. After the first year, EPA would review the results of the sampling and could modify the monitoring program to add or remove homes from the program. EPA anticipates that vapor monitoring would include soil gas, indoor air, soil and shallow groundwater sampling. EPA would continue vapor monitoring until it is clear that site-related vapors will remain below acceptable levels. This alternative assumes that EPA would conduct vapor monitoring at 25 homes for 1 to 2 years, and then continue monitoring at 10 homes for another 5 years. The details of the final vapor monitoring program would be developed based on the results of pre-design investigations conducted to address the uncertainties identified in the 2003 Air Sampling Report (Appendix G, Section 6.5 and 7.2.2).

Contingency Actions: EPA would implement contingency actions if monitoring identifies the need for modifications or changes in the remedy. Contingency actions would include:

- Confirmation sampling;
- Collecting samples more frequently;
- Contaminant fate and transport modeling;
- Human health and ecological risk assessment;
- Collecting surface water and/or sediment samples from the Rock River;
- Temporary well point sampling/vertical profiling, or other characterization activities;
- Installing new monitoring wells;
- Adding locations to the vapor monitoring program or modifying the vapor monitoring program;
- Adding private wells to the groundwater monitoring program;
- Notifying the Winnebago County Health Department of changes in the extent of the contaminated groundwater plume and of changes in chemical concentrations within the plume;

- Installing venting systems at homes where site-related vapors do not remain below acceptable levels;
- Modifying the pumping rate(s) of the extraction wells;
- Conducting a source area investigation;
- Evaluating whether additional response actions, such as constructing additional extraction wells, installing treatment units at individual private wells, connecting additional homes to the NPPWD, or remediating source area(s) are necessary; and
- Implementing additional response actions.

EPA's detailed cost estimate for this alternative is provided in Appendix H. The actual cost of the pump and treat alternative could be significantly less and would depend on the results of sampling conducted prior to design and the results of the long-term monitoring programs.

2.9.3 Alternative 3 - Monitored Natural Attenuation

Remedy Components: Natural attenuation through stream capture and dilution, with dispersion, advection and some biodegradation occurring within the plume; local groundwater use controls; monitoring; and contingency actions.

Common Elements and Distinguishing Features: Natural attenuation processes would be the same as those occurring under Alternative 1 - No Further Action. However, similar to Alternative 2 - Groundwater Pump and Treat, the monitored natural attenuation alternative also includes local groundwater use controls, monitoring and contingency actions. Key ARARs are:

- Safe Drinking Water Act MCLs;
- Illinois Primary Drinking Water Standards, 35 IAC Part 611.

The local groundwater use controls, monitoring and contingency actions make the short-term effectiveness and long-term reliability of this alternative high.

Expected Outcomes: EPA expects that groundwater would be returned to drinking water levels in approximately 12 years. EPA is able to verify that potential site-related risks from the vapor intrusion pathway remain below acceptable levels and that private wells are not impacted. Groundwater use is limited in areas where it is uncertain whether groundwater contaminants are still above drinking water levels. Monitoring verifies that contaminant concentrations are decreasing; that the Rock River is not being impacted; and that the area of groundwater contamination is not expanding.

Estimated Capital Cost: $1.8 million

Estimated Annual Operation and Maintenance (O&M) Costs:
Years 1-2: $1.67 million
Years 3-5 $1 million
Years 6-7: $835,000
Years 8-10: $127,000
Years 11-15: $ 64,000

Estimated Present Worth: $8.5 million

Estimated Time to Construct: 0 months

Estimated Time Until Groundwater Cleaned Up to Drinking Water Levels for TCE and PCE: 12 years

NOTE: *Costs include a 25% contingency and a 7% discount rate. Costs assume that groundwater monitoring will continue annually for 3 years after cleanup levels are attained. The actual cost of this alternative could be significantly less and would depend on the results of sampling conducted prior to developing the long-term groundwater and vapor monitoring plans, as well as the results of the long-term monitoring.*

Discussion: This alternative relies on natural processes including stream capture and dilution, with dispersion, advection and some intrinsic biodegradation occurring within the plume, to reduce the chemical concentrations in the groundwater to cleanup levels and return the aquifer to its potential use as a drinking water supply. As the levels of groundwater contaminants decrease, any site-related contaminants in soil gas and area homes are also expected to decrease.

Groundwater data at available same-sampled locations from 1991 to 2002 shows significant decreases in TCE and PCE concentrations over time. TCE decreased from a maximum concentration of 91 ug/l in a residential well in 1991 to 22 ug/l when the well was resampled in 1996. PCE has also decreased from a maximum concentration of 40 ug/l in MW-103S in 1994-1995 to 5.9 ug/l in 2002. Although the horizontal and vertical limitations of the 2000 and 2002 sampling points lend some uncertainty as to the extent and concentrations of the remaining groundwater contaminants at the site, recent sampling indicates that groundwater contaminants only slightly exceed MCLs at three locations: MW-103 near Ecolab, in the upgradient area of the groundwater contamination (PCE at 5.9 ug/l); near Blue Spruce Drive and Straw Lane (TCE at 6 ug/l), and MW-3 near Wagon Lane and Tanawingo (TCE at 7.2 ug/l).

After passing through the subdivisions, most, if not all of the contaminated groundwater discharges to the Rock River, which is a major river and a principal area for regional groundwater discharge. Once in the river, the groundwater contaminants become so diluted they are harmless, and eventually break down into less toxic substances. Because the river is capturing the groundwater contamination, EPA does not expect the groundwater contamination to spread significantly, if at all, beyond the river. Sampling conducted by IDPH, IEPA and EPA from 1991 to 2002 also indicates that the plume is not getting any wider.

EPA's BIOSCREEN groundwater modeling indicates that under natural conditions, TCE concentrations will decrease to below the MCL in about 3 years (2006), and PCE concentrations will decrease to below the MCL in about 12 years (2015). Other modeling EPA conducted based on natural decay following first-order kinetics indicates that TCE could decrease to below the MCL in as little as 1.5 years, and PCE could decrease to below the MCL in only 3 years. For the purposes of the FS and this ROD, EPA is conservatively assuming that it would take about 12 years for the groundwater contaminants to attain MCLs under natural conditions.

Additional information about the modeling used to estimate the cleanup time frames for the monitored natural attenuation alternative is provided in Section 8.4.1 and Appendix F of the RI and Section 5.5.1 of the Groundwater Data Evaluation Report, which are included in this ROD as Appendix B.

The monitored natural attenuation alternative also includes:

Local Groundwater Use Controls: Same as Alternative 2.

Groundwater and Residential Well Monitoring: EPA would sample monitoring wells and residential wells to track the progress of natural attenuation over time and to ensure that the remedy remains protective of human health and the environment until the cleanup levels are attained. The monitoring will also verify that the contaminated groundwater is not impacting the Rock River as it discharges into the river. EPA would identify changes in land and groundwater use and changes in groundwater conditions that could affect the performance or the protectiveness. This alternative assumes that EPA would continue monitoring for 3 years after cleanup levels are attained, and that 30 groundwater monitoring wells (10 existing wells and 20 new wells) and 10 residential wells would be sampled for 15 years. This alternative assumes that sampling would be conducted quarterly for the first 5 years, semi-annually for the next 5 years and annually for the last 5 years. The need for, and the location of the new groundwater monitoring wells, and the details of the final groundwater and residential well monitoring programs, would be developed based on pre-design investigations conducted to address the uncertainties identified in the 2003 Groundwater Data Evaluation Report (Appendix G, Section 6.4 and Section 7.2.1).

Vapor Monitoring: Same as Alternative 2.

Contingency Actions: EPA would implement contingency actions if monitoring identifies the need for modifications or changes in the remedy. Contingency actions would include:

- Confirmation sampling;
- Collecting samples more frequently;
- Contaminant fate and transport modeling;
- Human health and ecological risk assessment;
- Collecting surface water and/or sediment samples from the Rock River;
- Temporary well point sampling/vertical profiling;
- Installing new monitoring wells;
- Adding locations to the vapor monitoring program or modifying the vapor monitoring program;
- Adding private wells to the groundwater monitoring program;
- Notifying the Winnebago County Health Department of changes in the extent of the contaminated groundwater plume and of changes in chemical concentrations within the plume;
- Installing venting systems at homes where site-related vapors did not remain below acceptable levels;
- Conducting a source area investigation;
- Evaluating whether additional response actions, such as constructing a groundwater pump and treat system, installing treatment units at individual private wells, connecting additional homes to the NPPWD, or remediating source area(s) are necessary; and
- Implementing additional response actions.

EPA's detailed cost estimate for this alternative is provided in Appendix I. The actual cost of this alternative could be significantly less and would depend on the results of

sampling conducted prior to developing the long-term groundwater and vapor monitoring plans, as well as the results of the long-term monitoring.

2.10 COMPARATIVE ANALYSIS OF ALTERNATIVES

EPA evaluated the relative performance of each remedial alternative in the FS using the nine criteria set forth in the NCP at 40 C.F.R. §300.430. From this evaluation, EPA determines which alternative provides the "best balance" of trade-offs with respect to the evaluation criteria and the other alternatives.

Threshold Criteria

The following two criteria, overall protection of human health and the environment, and compliance with Applicable or Relevant and Appropriate Requirements (ARARs) are threshold criteria that must be met in order for EPA to select an alternative.

2.10.1 Overall Protection of Human Health and the Environment

Overall protection of human health and the environment addresses whether each alternative provides adequate protection of human health and the environment and describes how risks posed through each exposure pathway are eliminated, reduced or controlled through treatment, engineering controls and/or institutional controls.

The no further action alternative (Alternative 1) does not meet the requirement for overall protection of human health and the environment. EPA expects chemical concentrations in the groundwater to naturally decrease over time. Additionally, as the levels of contaminants in the groundwater decrease, any site-related contaminants in the soil gas and in area homes are also expected to decrease. However, the no action alternative does not include the groundwater use controls, monitoring or contingency actions that would be needed to ensure that human health and the environment are protected.

Alternative 2 (groundwater pump and treat) and Alternative 3 (monitored natural attenuation) protect human health and the environment by eliminating, reducing or controlling the risks posed by the groundwater contamination.

The groundwater pump and treat alternative protects human health and the environment by using an engineered system to actively pump and treat the contaminated groundwater and return the groundwater to drinking water levels. As the levels of contaminants in the groundwater decrease, EPA expects any site-related contaminants in the soil gas and in area homes to decrease. The pump and treat alternative would also contain groundwater contaminants and prevent them from flowing into the Rock River and spreading into other areas. However, since there is no evidence that surface water or sediment in the Rock River has been impacted by site-related contaminants, or that the groundwater contamination is spreading, the added benefit of hydraulically containing the groundwater is marginal.

Groundwater use controls would limit the contaminated groundwater from being used as a water supply until the cleanup is complete. Monitoring would verify that contaminant concentrations are decreasing; that private wells are not impacted; that the plume is being contained; and that potential site-related risks from the vapor intrusion

pathway remain below acceptable levels. EPA would implement contingency actions if site conditions changed or were found to be different than anticipated.

The monitored natural attenuation alternative uses local groundwater use controls, monitoring and contingency actions to protect human health and the environment while natural processes such as stream capture and dilution, with dispersion, advection and degradation occurring within the plume reduce chemical concentrations in the groundwater to drinking water levels and minimize further spreading of the contaminant plume. The Rock River is capturing groundwater contaminants, where they become so diluted they are harmless and will eventually break down into less-toxic substances. As the levels of contaminants in the groundwater decrease, EPA expects any site-related contaminants in the soil gas and in area homes to decrease.

Groundwater use controls would limit the contaminated groundwater from being used as a water supply until the cleanup is complete. Monitoring would verify that contaminant concentrations are decreasing; that private wells and the Rock River are not being impacted; that the area of groundwater contamination is not expanding; and that potential site-related risks from the vapor intrusion pathway remain below acceptable levels. EPA would implement contingency actions if site conditions changed or were found to be different than anticipated.

2.10.2 Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

Section 121(d) of CERCLA requires that remedial actions at CERCLA sites comply with legally applicable or relevant and appropriate federal and state requirements, standards, criteria and limitations which are collectively referred to as "ARARs," unless such ARARs are waived under CERCLA Section 121(d)(4).

Applicable requirements are those substantive environmental protection requirements, criteria or limitations promulgated under federal or state law that specifically address hazardous substances, the remedial action to be implemented at a site, the location of the site or other circumstances present at the site. Relevant and appropriate requirements are those substantive environmental protection requirements, criteria or limitations promulgated under federal or state law which, while not applicable to the hazardous materials found at a site, the remedial action, the site location or other circumstances at the site, nevertheless address problems or situations sufficiently similar to those encountered at the site that their use is well-suited to the site.

Compliance with ARARs addresses whether a remedy will meet all of the applicable or relevant and appropriate requirements of other federal and state environmental statutes or provides a basis for invoking a waiver.

Table 12 summarizes the ARARs that EPA identified as being applicable or relevant and appropriate for the remedial action at the Evergreen Manor site. Because the no-action alternative does not involve conducting any remedial action at the site, an ARARs analysis is not necessary for Alternative 1.

EPA expects the groundwater pump and treat alternative (Alternative 2) and the monitored natural attenuation alternative (Alternative 3) to comply with all ARARs. These alternatives involve engineered or natural processes to address groundwater contamination and are expected to comply with the Safe Drinking Water Act (SDWA)

and Illinois Primary Drinking Water Standards (35 IAC Part 611). Alternatives 2 and 3 involve construction or other sampling activities and are expected to comply with the Occupational Safety and Health Act (OSHA). Both alternatives have the potential to generate non-hazardous solid waste (e.g., construction debris or non-hazardous soil debris) and are expected to comply with the Resource Conservation and Recovery Act (RCRA) regulations for solid waste disposal.

Additionally, Alternative 3 may also involve the generation and storage of hazardous waste (e.g., spent carbon); the production of air emissions; discharges to a surface water body; and construction involving excavation. This alternative is also expected to comply with the Resource Conservation and Recovery Act (RCRA), the Clean Air Act (CAA), the Clean Water Act (CWA), Illinois Effluent Standards (35 IAC Part 304), and Illinois Permits and General Air Pollution Regulations (35 IAC Part 201).

Primary Balancing Criteria

The remaining seven criteria are primary balancing criteria.

2.10.3 Long-Term Effectiveness and Permanence

Long-term effectiveness and permanence refers to the expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup levels have been met. This criterion includes the consideration of residual risk and the adequacy and reliability of controls.

The no further action alternative (Alternative 1) does not provide long-term effectiveness and permanence. EPA expects chemical concentrations in the groundwater and soil gas to attenuate naturally over time. However, because this alternative does not require any cleanup levels or include groundwater use controls, monitoring or contingency actions, the long-term effectiveness and permanence of this alternative could not be verified.

Alternative 2 (groundwater pump and treat) provides long-term effectiveness and permanence by using an engineered treatment system to permanently remove groundwater contaminants from the aquifer. Alternative 3 (monitored natural attenuation) provides long-term effectiveness and permanence by monitoring the groundwater to ensure that natural processes permanently remove groundwater contaminants from the aquifer and/or permanently disperse and/or transform groundwater contaminants into less-toxic chemicals. These alternatives return the contaminated groundwater to a usable source of drinking water and offer a high degree of long-term effectiveness and permanence. As the levels of contaminants in the groundwater decrease, EPA expects any site-related contaminants in the soil gas and in area homes to decrease.

2.10.4 Reduction of Toxicity, Mobility or Volume Through Treatment

Reduction of toxicity, mobility or volume through treatment refers to the anticipated performance of the treatment technologies that may be included as part of a remedy. This criterion addresses EPA's statutory preference for selecting remedial actions which include, as a principal element, treatment that permanently and significantly reduces the volume, toxicity, or mobility of the hazardous substances, pollutants, and contaminants.

Under current conditions and the conditions observed at the site since 1990, the no further action alternative (Alternative 1) and the monitored natural attenuation alternative (Alternative 3) provide for some reduction of toxicity, mobility or volume through natural treatment processes, since the presence of cis-1,2-DCE and other breakdown products indicates that some of the groundwater contaminants are degrading. However, this degree of biodegradation is not significant. Also, under the no further action alternative, EPA could not verify the effects of these natural processes since there would not be any monitoring.

The groundwater pump and treat option (Alternative 2) provides a high level of reduction in toxicity, mobility or volume through treatment by collecting and actively treating all groundwater contaminants.

2.10.5 Short-Term Effectiveness

Short-term effectiveness considers the time it takes to implement a remedy; the time to reach cleanup objectives; and the risks an alternative may pose to site workers, the community, and the environment while the remedy is being implemented and until the cleanup goals are attained.

The no further action alternative (Alternative 1) would not be effective in the short-term since this alternative does not include monitoring, local groundwater use controls or contingency plans. Homes in the area could be exposed to site-related vapors above risk-based levels and private wells could be impacted. New wells could be installed in areas where municipal water is not available and where it is uncertain whether groundwater contaminants are still above drinking water levels. The groundwater contaminants could spread and the Rock River could be adversely affected.

The groundwater pump and treat alternative (Alternative 2) is slightly more effective than the monitored natural attenuation alternative (Alternative 3) in the short-term since it would clean up the contaminated groundwater in about two-thirds as much time as the monitored natural attenuation alternative - 8 years for groundwater pump and treat compared to 12 years for monitored natural attenuation. However, the short-term risks to the community common to both alternatives (e.g., exposure to contaminated groundwater) would be minimized by local groundwater controls, monitoring and contingency actions.

With both alternatives, EPA would use local groundwater controls to limit the contaminated groundwater from being used as a water supply until the cleanup was complete. Monitoring would verify that contaminant concentrations are decreasing; that private wells and the Rock River are not impacted; that the area of groundwater contamination is not expanding; and that potential site-related risks from the vapor intrusion pathway remain below acceptable levels. EPA would implement contingency actions if site conditions changed or were different than EPA anticipated.

The groundwater pump and treat alternative and the monitored natural attenuation alternative also pose some short-term risks to workers during the implementation and the operation of the remedy, but these risks are manageable through proper health and safety practices. Potential environmental impacts for the groundwater pump and treat alternative and the monitored natural attenuation alternative would be minimized by compliance with air emissions, water discharge limits and solid waste regulations. The

no further action alternative does not include any response actions and does not pose any short-term risks from implementation.

2.10.6 Implementability

Implementability addresses the technical and administrative feasibility of a remedy from design through construction and operation. Factors such as the availability of services and materials, administrative feasibility and coordination with other government entities are also considered.

The no further action alternative (Alternative 1) is technically and administratively feasible because it would only require properly abandoning existing monitoring wells. The monitored natural attenuation alternative (Alternative 3) is readily implementable. There is already an existing network of monitoring wells in the area and any new monitoring wells should not be difficult to install. Local groundwater use controls and a municipal water supply are already in place.

The equipment for the groundwater pump and treat system (Alternative 2) is commonly used and readily available. However, this alternative is slightly more difficult to implement than monitored natural attenuation. The pump and treat alternative would require access or easements for the 23 groundwater extraction wells, the three treatment buildings and the pipes. The pump and treat system would also have to comply with the substantive requirements of an NPDES permit and Illinois Effluent Standards, federal and state air emissions requirements and solid and hazardous waste regulations. EPA estimates that it would take about 6 to 12 months to construct the groundwater pump and treat system.

2.10.7 Cost

Cost includes estimated capital and operation and maintenance costs as well as present worth costs. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a rage of +50 to -30 percent.

EPA's estimated capital, annual O&M and present worth costs for the alternatives are shown in Table 13. Minor costs would be incurred with the no further action alternative (Alternative 1) to properly abandon the existing groundwater monitoring wells at the site. The present worth cost of the groundwater pump and treat alternative (Alternative 2) is $25.1 million. This cost is significantly higher than the present worth cost for the monitored natural attenuation alternative (Alternative 3) which is $8.5 million. Based on current conditions and the conditions observed in the groundwater since 1990, the availability of the municipal water supply and local government controls such as the Winnebago County Code, and, considering the monitoring and contingency actions that would be implemented, the increased cost of the groundwater pump and treat alternative provides only slightly more protection than the monitored natural attenuation alternative.

2.10.8 State Acceptance

State acceptance considers whether the State of Illinois agrees with EPA's analysis and selected remedy for the Evergreen Manor site.

The State of Illinois indicated that it is willing to concur with EPA's selection of Alternative 3 - Monitored Natural Attenuation as the remedy for the Evergreen Manor site at this time. When EPA receives the state's letter of concurrence, it will be attached to the ROD as Appendix J.

2.10.9 Community Acceptance

Community acceptance considers whether the local community agrees with EPA's analysis and recommended alternative. Comments received on EPA's proposed cleanup plan are an important indicator of community acceptance. During the public comment period EPA received comments on its proposed cleanup plan from the Winnebago County Health Department, 6 residents, Waste Management and Ecolab.

The Winnebago County Health Department supports EPA's monitored natural attenuation cleanup plan for the site and the more extensive vapor monitoring planned by EPA.

Two residents commented that EPA should clean up the site through a groundwater pump and treat system instead of allowing the contaminants to naturally attenuate. Other residents had comments and questions concerning the extent of the groundwater contamination, the health effects of TCE and PCE and about how EPA would ensure that residents were not affected by the groundwater contamination and vapors during the cleanup.

Waste Management and Ecolab generally agree with monitored natural attenuation as the overall cleanup approach for the site. However, both companies disagree with the extent of groundwater characterization and groundwater monitoring activities anticipated by EPA, and contend that the additional vapor characterization and vapor monitoring anticipated by EPA is not warranted. Regal-Beloit did not submit any comments during the public comment period.

The comments received during the public comment period and EPA's responses to these comments are described in more detail in the Responsiveness Summary which is included in Section 3 of this ROD.

2.11 THE SELECTED REMEDY

The selected remedy for the Evergreen Manor site is Alternative 3 - Monitored Natural Attenuation. This alternative includes local groundwater use controls; groundwater, residential well and vapor monitoring; and contingency actions.

The ultimate objective for the Evergreen Manor site is to return the contaminated groundwater to its beneficial use as a supply of drinking water. Two separate lines of evidence indicate that monitored natural attenuation would be successful in attaining these remedial objectives. They are:

1) Information collected during the RI and EPA's 2002 investigation; and residential well and groundwater monitoring data collected from 199 0 to 1998. These data show that TCE and PCE concentrations are declining. These data also indicate that the Rock River is capturing most, if not all of the groundwater contaminants, and that the boundaries of the plume are expected to remain relatively stable over time; and

2) Predictive modeling conducted during the RI and the FS.

Based on these lines of evidence, and after a careful analysis of all the remedial alternatives for the groundwater, EPA believes that the selected remedy, Alternative 3 - Monitored Natural Attenuation, will achieve this objective in a reasonable time frame for this site. Monitored natural attenuation will return the contaminated groundwater to its beneficial use as a supply of drinking water. As the levels of contaminants in the groundwater decrease, EPA expects any site-related contaminants in the soil gas and in area homes to decrease.

EPA estimates that it will take about 12 years for the groundwater contamination to decrease to the cleanup levels for TCE and PCE (cleanup complete in 2015). The cleanup levels for the groundwater contaminants are specified in Table 14. This cleanup time frame of 12 years is slightly longer than the cleanup time frame of 8 years EPA estimated for Alternative 2 (cleanup complete in 2011), which involves pumping and treating the contaminated groundwater. Additional information about the modeling EPA used to estimate the cleanup times for the monitored natural attenuation alternative is in Section 8.4.1 and Appendix F of the RI and Section 5.5.1 of the Groundwater Data Evaluation Report, which are included in this ROD as Appendix B.

Although EPA's estimated time for natural processes to attain remedial objectives is slightly longer than the cleanup time EPA estimated for the groundwater pump and treat alternative, EPA considers an approximate time frame of 12 years to be reasonable at the Evergreen Manor site. In 1999-2000 EPA connected 281 homes with contaminated and threatened well supplies in the site area to the NPPWD municipal water supply and permanently sealed the private wells at the connected homes. The NPPWD obtains most of its water from four wells located three to four miles south of the Evergreen Manor site that are not in danger of becoming contaminated by the site. Contaminants have been found in two very deep standby wells (450 to 780 feet deep) operated by the NPPWD located about 0.25 mile east of the site. Sampling indicates that this contamination is most likely coming from a contaminated coating found on the well pipes. At this time, EPA does not consider the contamination in the standby wells to be site-related. The standby wells are not in use and the contamination is being addressed through EPA's Safe Drinking Water Program.

In areas where municipal water is available, Winnebago County Code Article III, Section 86-111 requires new water users to connect to the public water supply instead of drilling a well. Because the areas where groundwater contaminants are still above drinking water levels are serviced by the NPPWD, EPA does not expect any new wells to be installed in these areas. In areas where municipal water is not available and where it is uncertain whether groundwater contaminants are still above drinking water levels, Section 86-114 of the Code (Well-Permitting Requirements), along with monitoring and contingency actions, will limit groundwater use in these areas, and will ensure that people are not exposed to groundwater contaminants until the cleanup levels are attained.

Records and sampling data indicate that the sources of the groundwater contamination have been addressed under state oversight and/or private actions. As a result, EPA does not believe that any further action is needed to investigate and/or address these source areas at this time.

2.11.1 Remedy Components

The primary components of the monitored natural attenuation remedy include:

Natural Attenuation: Natural attenuation will be used to restore the groundwater to maximum contaminant levels (MCLs) and Illinois Primary Drinking Water Standards (35 IAC Part 611) for TCE, PCE and other site-related chemicals. Based on EPA's investigations, the following chemicals may also be site-related and may be present in the groundwater above risk-based levels: benzene, ethyl benzene, toluene, xylenes, acetone, methylene chloride, Freon 113, 2-butanone, 1,1,1-TCA, cis-1,2-DCE and other breakdown products of TCE and PCE. Based upon the potential for exposure to multiple contaminants in the groundwater, the total excess lifetime risks from exposure to groundwater will also be reduced to 1E-04 or less for carcinogenic risks and a hazard index of less than 1.0 for noncancer risks.

The primary attenuation processes at the Evergreen Manor site are stream capture and dilution, with dispersion, advection and some biodegradation occurring within the plume. EPA estimates that the groundwater will be cleaned up to drinking water levels in about 12 years. As the levels of contaminants in the groundwater decrease, EPA expects any site-related contaminants in the soil vapors and in area homes to decrease.

Groundwater data at available same-sampled locations from 1991 to 2002 shows significant decreases in TCE and PCE concentrations over time. TCE decreased from a maximum concentration of 91 ug/l in a residential well in 1991 to 22 ug/l when the well was resampled in 1996. PCE has also decreased from a maximum concentration of 40 ug/l in MW-103S in 1994-1995 to 5.9 ug/l in 2002. Although the horizontal and vertical limitations of the 2000 and 2002 sampling points lend some uncertainty as to the extent and concentrations of the remaining groundwater contaminants at the site, EPA's recent sampling indicates that groundwater contaminants only slightly exceed MCLs at three locations: MW-103 near Ecolab, in the upgradient area of the groundwater contamination (PCE at 5.9 ug/l); near Blue Spruce Drive and Straw Lane (TCE at 6 ug/l), and MW-3 near Wagon Lane and Tanawingo (TCE at 7.2 ug/l).

After passing through the subdivisions, most, if not all of the contaminated groundwater discharges to the Rock River, which is a major river and a principal area for regional groundwater discharge. Once in the river, the groundwater contaminants become so diluted they are harmless, and eventually break down into less toxic substances. Because the river is capturing the groundwater contamination, EPA does not expect the groundwater contamination to spread significantly, if at all, beyond the river. Sampling conducted by IDPH, IEPA and EPA from 1991 to 2002 also indicates that the plume is not getting any wider.

EPA's BIOSCREEN groundwater modeling indicates that under natural conditions, TCE concentrations will decrease to below the MCL in about 3 years (by 2006), and PCE concentrations will decrease to below the MCL in about 12 years (by 2015). Other modeling EPA conducted based on natural decay following first-order kinetics indicates that TCE could decrease to below the MCL in as little as 1.5 years, and PCE could decrease to below the MCL in only 3 years. For the purposes of the FS and this ROD, EPA is conservatively assuming that it would take about 12 years for the groundwater contaminants to attain MCLs under natural conditions (until 2015). The significant

decreases in groundwater concentrations observed from 1990 to 2002 reduces the uncertainty of the modeling predictions.

Institutional Controls: EPA will use local government controls to limit the use of contaminated groundwater as a water supply until the cleanup is complete. Winnebago County has two ordinances that accomplish this (Winnebago County Code Article III, November 1999). Section 86-111 of the code requires all properties within 200 feet of a public water supply to connect to the water supply instead of drilling a well. The areas where groundwater contaminants are still above drinking water standards are serviced by the North Park water supply so EPA does not expect any new wells to be permitted in these areas.

In areas where municipal water is not available and where it is uncertain whether groundwater contaminants are still above drinking water levels, Section 86-114 of the code applies. This section of the code requires property owners to obtain a well permit for a new well or for well repairs. On the permit, the county can notify the applicant that the well is located in a contaminated area and can recommend that the well be sampled for contaminants. If contaminants are detected, the county can recommend that a home treatment unit be installed. The county can also recommend that new and redrilled wells be installed below the zone of contamination so that only clean water comes into the wells; and can notify EPA when a new permit is issued in the area.

A copy of Winnebago County Code Article III, Sections 86-111 and 86-114 is provided in Appendix E.

Groundwater and Residential Well Monitoring: EPA will carefully monitor the groundwater and residential wells in the area to track the progress of natural attenuation over time and to ensure that the remedy remains protective of human health and the environment until the cleanup levels are attained. The monitoring will also verify that the contaminated groundwater is not impacting the Rock River as it discharges into the river. Changes in land and groundwater use and changes in groundwater conditions that could affect the performance or the protectiveness of the remedy will also be identified.

EPA currently anticipates that groundwater and residential well monitoring will continue for 3 years after the cleanup levels are attained to verify that the groundwater contaminants will remain below cleanup levels on a permanent basis, and that the monitoring will be conducted for approximately 15 years total. EPA currently anticipates that the groundwater and residential well monitoring programs will include sampling at 30 groundwater monitoring wells (10 existing wells and 20 new wells) and 10 residential wells. EPA also anticipates that the sampling frequency will be quarterly for the first 5 years, semi-annually for the next 5 years and annually for the last 5 years. Quarterly sampling during the first 5 years of monitoring would help define baseline conditions, including seasonal changes, of the expanded monitoring well network.

The need for, and the location of the new groundwater monitoring wells, and the details of the final groundwater and residential well monitoring programs, will be developed during the remedial design phase based on the results of pre-design investigations conducted to address the uncertainties identified in the 2003 Groundwater Data Evaluation Report (Appendix G, Section 6.4 and 7.2.1).

Vapor Monitoring: EPA will conduct vapor monitoring at a statistically significant number of homes (approximately 25 homes) throughout the area four times a year (winter, spring, summer and fall) to verify that potential site-related risks from the vapor intrusion pathway remain below a total excess lifetime cancer risk of 1 x 10-4 and a noncancer hazard index of 1.0. EPA will conduct vapor monitoring over a one- to two-year period. After the first year, EPA will review the results of the sampling and may modify the monitoring program to add or remove homes from the program. EPA will continue vapor monitoring until it is clear that site-related vapors will remain below acceptable levels.

EPA currently anticipates that vapor monitoring will be conducted at about 25 homes for 1 to 2 years, and then continue at 10 homes for another 5 years. EPA currently anticipates that the vapor monitoring will include 4 24-hour soil gas samples, 3 24-hour indoor air samples, and 4 surface soil samples from each home sampled. One indoor air sample will be collected in the basement, one on the first floor, and one in the garage to distinguish household-related vapors from site-related vapors. One surface soil sample will be collected from each soil gas sample location to determine if there were any homeowner-related spills during the sampling period.

EPA anticipates that during the first 2 years of vapor monitoring, groundwater at and near the water table will be sampled at about 10 locations throughout the residential area. During the last 5 years of vapor monitoring, EPA anticipates that the groundwater at and near the water table will only need to be sampled at about 4 locations.

The details of the final vapor monitoring program will be developed during the remedial design phase based on the results of pre-design investigations conducted to address the uncertainties identified in the 2003 Air Sampling Report (Appendix G, Section 6.5 and 7.2.2).

Contingency Actions: EPA will implement contingency actions if monitoring identifies the need for modifications or changes in the remedy. EPA will consider implementing contingency actions if:

- The monitoring data indicates that contaminant levels are not continuing to decline as estimated in the modeling predictions (EPA currently anticipates that the groundwater will attain drinking water levels in about 12 years);
- EPA finds additional groundwater contaminants or significantly higher levels of contaminants in the groundwater;
- The area of groundwater contamination is expanding or groundwater contaminants are moving underneath and beyond the Rock River;
- Site-related soil vapors do not remain below acceptable risk-based levels;
- New wells are installed in contaminated areas or areas that may be contaminated;
- Groundwater contaminants are detected in private wells;
- Undeveloped areas of the site are developed;

- The groundwater monitoring indicates that there may be unacceptable impacts to the Rock River;

Contingency actions include:

- Confirmation sampling;
- Collecting samples more frequently;
- Contaminant fate and transport modeling;
- Human health and ecological risk assessment;
- Collecting surface water and/or sediment samples from the Rock River;
- Temporary well point sampling/vertical profiling, or other characterization activities;
- Installing new monitoring wells;
- Adding locations to the vapor monitoring program or modifying the vapor monitoring program;
- Adding private wells to the groundwater monitoring program;
- Notifying the Winnebago County Health Department of changes in the extent of the contaminated groundwater plume and of changes in chemical concentrations within the plume;
- Installing venting systems at homes where site-related vapors do not remain below acceptable levels;
- Conducting a source area investigation;
- Evaluating whether additional response actions, such as constructing a groundwater pump and treat system, installing treatment units at individual private wells, connecting additional homes to the NPPWD, or remediating source area(s) are necessary; and
- Implementing additional response actions.

2.11.2 Cost Estimate

EPA's cost estimate for monitored natural attenuation was developed in the FS and is summarized in Table 15. The detailed cost estimate for the selected remedy is included as Appendix I. EPA calculated the costs assuming a 25% contingency and a 7% annual discount rate.

The capital costs are for the pre-design investigations (Appendix G, Sections 6.4, 6.5, 7.2.1 and 7.2.2), and for the installation of approximately 20 new groundwater monitoring wells (10 shallow and 10 deep) and 10 piezometers to supplement the existing monitoring well network. The annual O&M costs are based on the groundwater, residential well and vapor monitoring programs currently anticipated by EPA. The actual cost of this alternative may be significantly less and will depend on the results of the pre-design investigations, as well as the results of the long-term monitoring.

2.11.3 Estimated Outcomes of the Selected Remedy

The estimated outcomes of the selected remedy are to return the contaminated groundwater to a usable supply of drinking water in approximately 12 years. This will be done by reducing the chemical concentrations of TCE, PCE and other site-related chemicals in the groundwater to concentrations below MCLs and Illinois Primary Drinking Water Standards (35 IAC Part 611). Because the groundwater contains more than one contaminant, groundwater contaminants will also be reduced to concentrations that correspond to a total excess lifetime cancer risk of 1 x 10-4 or less

and a noncancer hazard index less than 1.0. Based on the results of EPA's soil gas investigation, other site-related chemicals may include benzene, ethyl benzene, toluene, xylenes, acetone, methylene chloride, Freon 113, 2-butanone, 1,1,1-TCA, cis-1,2-DCE and other breakdown products of TCE and PCE. These chemicals may also be present in the groundwater above acceptable levels. As the levels of contaminants in the groundwater decrease, EPA expects any site-related contaminants in the soil vapors and in area homes to decrease.

By implementing the selected remedy, EPA to be able to verify that potential risks from site-related soil vapors remain below a total excess lifetime cancer risk of 1 x 10-4 and a non cancer hazard index of 1.0, and that private wells are not impacted above acceptable levels. EPA will use local groundwater controls to limit groundwater use in areas where contaminants are still above drinking water levels and in areas where it is uncertain whether groundwater contaminants are still above drinking water levels. EPA will be able to verify that the plume is not significantly expanding and that the Rock River is not being impacted by groundwater contaminants as the groundwater discharges into the river. EPA will implement contingency actions as necessary if site conditions change or are different than EPA anticipates to ensure that the remedy remains protective.

2.12 STATUTORY DETERMINATIONS

Under CERCLA § 121 and the National Contingency Plan, 40 C.F.R. Part 300, EPA must select remedies that: protect human health and the environment; comply with applicable or relevant and appropriate requirements, unless a statutory waiver is justified; are cost-effective; and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous wastes as a principal element. CERCLA also has a bias against off-site disposal of untreated wastes. This section discusses how the selected remedy meets these statutory requirements.

2.12.1 Protection of Human Health and the Environment

The selected remedy, Alternative 3, will protect human health and the environment through: natural attenuation processes including stream capture and dilution, with dispersion, advection and some biodegradation occurring within the plume; local groundwater use controls; groundwater, residential well and vapor monitoring; and, if necessary, contingency actions.

EPA estimates that it will take about 12 years for the groundwater contaminants to decrease to drinking water levels. EPA expects a cleanup time frame of 12 years to be reasonable at this site. EPA expects this because EPA does not expect the contamination to migrate significantly beyond its present boundaries and because EPA will use local government controls, monitoring and contingency actions to prevent people from being exposed to unacceptable levels of groundwater contaminants until the cleanup is complete. As the levels of contaminants in the groundwater decrease, EPA expects any site-related contaminants in the soil vapors and in area homes to decrease.

Groundwater data at available same-sampled locations from 1991 to 2002 shows significant decreases in TCE and PCE concentrations over time. TCE decreased from a maximum concentration of 91 ug/l in a residential well in 1991 to 22 ug/l when the well was resampled in 1996. PCE has also decreased from a maximum concentration of 40 ug/l in MW-103S in 1994-1995 to 5.9 ug/l in 2002. Although the horizontal and vertical limitations of the 2000 and 2002 sampling points lend some uncertainty as to the extent and concentrations of the remaining groundwater contaminants at the site, EPA's recent sampling indicates that groundwater contaminants only slightly exceed MCLs at three locations: MW-103 near Ecolab, in the upgradient area of the groundwater contamination (PCE at 5.9 ug/l); near Blue Spruce Drive and Straw Lane (TCE at 6 ug/l), and MW-3 near Wagon Lane and Tanawingo (TCE at 7.2 ug/l).

After passing through the subdivisions, most, if not all of the contaminated groundwater discharges to the Rock River, which is a major river and a principal area for regional groundwater discharge. Once in the river, the groundwater contaminants become so diluted they are harmless, and eventually break down into less toxic substances. Because the river is capturing the groundwater contamination, EPA does not expect the groundwater contamination to spread significantly, if at all, beyond the river. Sampling conducted by IDPH, IEPA and EPA from 1991 to 2002 also indicates that the plume is not getting any wider.

EPA's BIOSCREEN groundwater modeling indicates that under natural conditions, TCE concentrations will decrease to below the MCL in about 3 years (2006), and PCE concentrations will decrease to below the MCL in about 12 years (2015). Other modeling EPA conducted based on natural decay following first-order kinetics indicates that TCE could decrease to below the MCL in as little as 1.5 years, and PCE could decrease to below the MCL in only 3 years. For the purposes of the FS and this ROD, EPA is conservatively assuming that it would take about 12 years for the groundwater contaminants to attain MCLs under natural conditions (until 2015). The significant decreases in groundwater concentrations observed from 1990 to 2002 reduce the uncertainty of the modeling predictions.

2.12.2 Compliance with Applicable or Relevant and Appropriate Requirements

The selected remedy, Alternative 3, complies with all ARARs. ARARs are discussed in Section 2.9.3, Section 2.10.2 and Table 12 of this ROD. Chemical-, location- and action-specific ARARs include:

- Safe Drinking Water Act (SDWA), 42 U.S.C. §§ 300f-300j-11, which addresses acceptable concentration levels in groundwater that serves as a potential drinking water aquifer.

- Illinois Primary Drinking Water Standards (35 IAC Part 611).
- Clean Water Act (CWA), 33 U.S.C. §§ 1251-1387, which addresses acceptable concentration levels in surface water.

- Resource Conservation and Recovery Act (RCRA), 42 U.S.C. §§ 6901-6991i, which addresses generation and disposal of solid waste, both hazardous and non-hazardous.

- Occupational Safety and Health Act (OSHA), which addresses worker safety during construction, sampling and other activities.

2.12.3 Other Criteria, Advisories or Guidance to Be Considered (TBCs) for Thisthis Remedial Action

In implementing remedies, EPA and the State will often consider a number of non-binding criteria. EPA refers to such non-binding criteria as criteria "to be considered" (TBCs). There were no TBCs at this site.

2.12.4 Cost-Effectiveness

In EPA's judgment, the selected remedy is "cost-effective" and represents a reasonable value for the money to be spent. In making this determination, EPA used the following definition: "A remedy shall be cost-effective if its costs are proportional to its overall effectiveness." 40 C.F.R. § 300.430(f)(1)(ii)(D).

EPA evaluated cost-effectiveness here by first evaluating the "overall effectiveness" of those alternatives that satisfied the threshold criteria – i.e., those alternatives that were protective of human health and the environment and complied with ARARs. EPA evaluated overall effectiveness by assessing three of the five balancing criteria in combination – long-term effectiveness and permanence; reduction in toxicity, mobility and volume through treatment; and short-term effectiveness. EPA then compared overall effectiveness to cost to determine cost-effectiveness. EPA determined that the selected remedy's overall effectiveness was proportional to its costs and that, therefore, the selected remedy represents a reasonable value for the money to be spent.

EPA's estimated present worth cost of the selected remedy is $8.5 million. However, the actual cost of this alternative may be significantly less and will depend on the results of the pre-design investigations, as well as the results of the long-term monitoring. EPA believes that the selected remedy's combination of stream capture and dilution, with dispersion, advection and biodegradation within the plume, local groundwater use controls, monitoring and contingency actions, will provide an overall level of protection comparable to Alternative 2, the groundwater pump and treat alternative, at a significantly lower cost.

2.12.5 Utilization of Permanent Solutions and Alternative Treatment or Resource Recovery Technologies to the Maximum Extent Practicable

EPA has determined that the selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a practicable manner at the site. Of those alternatives that are protective of human health and the environment and comply with ARARs, EPA has determined that the selected remedy provides the best balance of trade-offs in terms of the five balancing criteria, while also considering: the statutory preference for treatment as a principal element; the statutory bias against off-site treatment and disposal; and State and community acceptance.

- *Long-term effectiveness*: the selected remedy reduces contamination of the groundwater and removes contamination from the groundwater.

- *Reducing toxicity, mobility and volume:* the selected remedy does not reduce the toxicity, mobility or volume of contamination. This is because this action does not address any source materials constituting principal threats at the site. Records and sampling data indicate that the sources of the groundwater contamination have been addressed under state oversight and/or private actions. As a result, EPA does

not believe that any further action is needed to investigate and/or address these source areas at this time.

- *Short-term effectiveness:* the selected remedy presents no short-term risks different from alternative remedies. Any risk due to the longer cleanup time will be minimal and managed.

- *Implementability:* the selected remedy is more implementable than alternative remedies of acceptable protectiveness -- specifically, Alternative 2, Groundwater Pump and Treat.

2.12.6 Preference for Treatment as a Principal Element

The selected remedy does not satisfy the statutory preference for treatment as a principal element of the remedy. This ROD addresses a large area of remaining low-level groundwater contamination from industrial sources that were addressed under state oversight and/or private actions from the 1970s to the 1990s. The generally low levels of contaminants found in the industrial area and the significant decreases in groundwater concentrations from 1990 to 2002 indicate that the sources of the groundwater contamination have been addressed and that no further action is needed to investigate and/or address these source areas at this time.

2.12.7 Five Year Review Requirements

This remedy will result in hazardous substances remaining in groundwater above levels that allow for unlimited use and unrestricted exposure. Therefore, EPA will conduct a review within five years after the initiation of the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

2.12.8 Construction Completion Listing

EPA's selected remedy at this site does not require physical construction. EPA will prepare a Preliminary Close-Out Report and the site will qualify for inclusion on the Construction Completion List.

2.13 EXPLANATION OF SIGNIFICANT CHANGES

The selected remedy is not significantly different from the proposed cleanup plan EPA issued for the site in July 2003.

SECTION 3
RESPONSIVENESS SUMMARY

3.1 BACKGROUND

EPA met the public participation requirements of Sections 113(k)(2)(i-v) and 117 of CERCLA during the remedy selection process. These sections require EPA to respond "...to each of the significant comments, criticisms, and new data submitted in written or oral presentations" on its proposed plan for remedial action. This Responsiveness Summary addresses the comments and concerns expressed by local government agencies, residents and the potentially responsible parties (PRPs) in written and oral comments received by EPA during the public comment period for the proposed final remedy for the Evergreen Manor site.

3.1.1 Information Repository

EPA maintains an Administrative Record file and an information repository for site documents at the North Suburban - Roscoe Branch Public Library, 5562 Clayton Circle, Roscoe, Illinois. EPA also maintains an Administrative Record file for the site at the EPA Region 5 Superfund Division Records Center, 77 W. Jackson, Chicago, Illinois. The public can access all major site-related documents at these repositories, including:

- 1992 Screening Site Inspection Report
- 1994 Expanded Site Investigation Report
- 1997 Hazard Ranking System Scoring Package
- 1998 EE/CA
- 1999 Action Memorandum for the NTCRA
- 1999 AOC
- 2001 RI Report
- 2003 Groundwater Data Evaluation Report
- 2003 Air Sampling Report
- 2003 FS Report

A complete index of all the documents in the Administrative Record file is included in Appendix A of this ROD. An electronic copy of the entire Administrative Record file, or specific documents in the Administrative Record file, may also be requested from the Region 5 Superfund Division Records Center in computer disc (CD) format.

3.1.2 Public Notices, Fact Sheets and Public Comment Period

On July 25, 2003, EPA ran an advertisement in the Rockford Register Star newspaper announcing its proposed cleanup plan for the Evergreen Manor site and inviting the public to comment on its plan. The advertisement included information about EPA's proposed plan, the other alternatives that EPA considered, the upcoming availability session and public meeting, and the public comment period. Starting on July 29, 2003, EPA also announced and included links to a copy of the Evergreen Manor Proposed Plan on the EPA Region 5 Home Page on the internet. The EPA Region 5 Home Page also advertised the public comment period for the site. On August 7, EPA also issued a press release announcing EPA's proposed plan, the public comment period and the

public meeting for the site. On July 22, 2003, EPA also mailed over 400 copies of its Proposed Plan to local residents and other interested parties.

The initial public comment period was from July 28 to August 26, 2003. On August 18, 2003, Waste Management and Ecolab requested a 30-day extension in the public comment period. Based on this request, EPA extended the comment period to September 25, 2003. EPA announced the 30-day extension in the comment period in an advertisement published in the Rockford Register Star on September 3, 2003. EPA also updated the public comment period information for the site on the EPA Region 5 Homepage.

3.1.3 Availability Session and Public Meeting

On August 19, 2003, EPA held an afternoon availability session and an evening public meeting in Roscoe. At the availability session, EPA and IEPA talked with area residents and other interested parties about the Evergreen Manor site one-on-one and answered questions. At the public meeting, EPA presented its proposed plan for the site to the community and answered questions about the site and the other cleanup alternatives that EPA considered. EPA also accepted oral comments on the proposed plan at the public meeting and used the availability session and the public meeting to solicit a wider cross-section of community input on the current and potential future uses of land and groundwater in the area.

The meetings were attended by approximately 20 people. The people who attended included representatives of IEPA and the Winnebago County Health Department, 3 newspaper reporters, 2 local television news reporters, 2 relators, 2 real estate developers, about 10 residents, and engineering representatives from Waste Management and Ecolab.

3.2 SUMMARY OF PUBLIC COMMENTS

EPA received comments on its proposed cleanup plan from the Winnebago County Health Department, 6 residents, Waste Management and Ecolab during the public comment period. Regal-Beloit did not submit any comments during the public comment period.

The Winnebago County Health Department supports EPA's monitored natural attenuation cleanup plan for the site and the more extensive vapor monitoring planned by EPA.

Two residents commented that EPA should clean up the site through a groundwater pump and treat system instead of allowing the contaminants to naturally attenuate. Other residents had comments and questions concerning the extent of the groundwater contamination, the health effects of TCE and PCE and about how EPA would ensure that residents were not affected by the groundwater contamination and vapors during the cleanup.

Waste Management and Ecolab generally agree with monitored natural attenuation as the overall cleanup approach for the site. However, both companies disagree with the extent of groundwater characterization and groundwater monitoring activities anticipated by EPA, and contend that the additional vapor characterization and vapor

monitoring anticipated by EPA is not warranted. Regal-Beloit did not submit any comments during the public comment period.

A summary of the comments that EPA received during the public comment period and EPA's responses to these comments are below. The comments and EPA's responses are addressed in three sections: local government comments, community issues and PRP comments.

3.2.1 Local Government Comments (LG Comments)

Comment LG-1: *The Winnebago County Health Department supports EPA's proposed monitored natural attenuation cleanup plan for the site. The Winnebago County Health Department is very supportive of EPA's 2002 indoor air and soil sampling and of the more extensive vapor sampling proposed in EPA's cleanup plan.*

EPA Response LG-1: EPA acknowledges the Winnebago County Health Department's support for the monitored natural attenuation cleanup plan and the more extensive vapor monitoring planned for the site. The actual number of homes included in the final vapor monitoring program will be determined during the remedial design phase based on the results of initial shallow groundwater and soil gas sampling. EPA will evaluate these results and select a statistically significant number of homes to be included in the final vapor monitoring program. Additional information about the shallow groundwater and soil gas sampling and the final vapor monitoring plan is in Section 2.11.1 of the ROD and Section 6.5 and 7.2.2 in Appendix G of the ROD.

Comment LG-2: *The Winnebago County Health Department recommends that EPA monitor some of the residential wells surrounding the site in addition to groundwater monitoring. There is nothing more reassuring to people living near a Superfund site than having their well tested.*

EPA Response LG-2: EPA's cleanup plan includes residential well sampling and long-term residential well monitoring. EPA will determine the actual number and locations of the residential wells to be monitored during the remedial design phase based on the results of additional groundwater characterization activities.

EPA will use temporary wells at various depths of the aquifer throughout the area with residential well sampling as needed to define the remaining extent of the groundwater contamination and contaminant concentrations within the plume. EPA will then use this information to develop long term groundwater and residential well monitoring programs with contingency actions to ensure that residential wells remain unaffected during the cleanup (see Section 2.11.1 and Appendix G, Section 6.4 and Section 7.2.1 of the ROD).

However, because of the significant decreases in TCE and PCE concentrations from 1990-2002 (see Section 2.5.3 of the ROD), EPA expects that this sampling will confirm that the extent of the contaminated area has decreased; that most of the groundwater contaminants are close to or below drinking water standards; and that the private wells outside the area of groundwater contamination remain unaffected. As a result, the final groundwater and residential well monitoring plans may not be that extensive.

Comment LG-3: *The Winnebago County Health Department would like additional information concerning the local government controls that EPA will use to limit groundwater use until the cleanup is complete. The Winnebago County Health Department issues new well permits for the county.*

EPA Response LG-3: EPA's understanding is that there are two Winnebago County ordinances that can be used to limit contaminated groundwater from being used as a water supply until the cleanup is complete. Winnebago County Code Article III, Section 86-111 (November 1999) requires all properties within 200 feet of a public water supply to connect to the water supply instead of drilling a well. The areas where groundwater contaminants are still above drinking water standards are serviced by the North Park water supply so U.S. EPA does not expect any new wells to be permitted in these areas.

In areas where municipal water is not available and where it is uncertain whether groundwater contaminants are still above drinking water levels, Section 86-114 of the code applies. This section of the code requires property owners to obtain a well permit for a new well or for well repairs. On the permit, the county can notify the applicant that the well is located in a contaminated area and can recommend that the well be sampled for contaminants. If contaminants are detected, the county can recommend that a home treatment unit be installed. The county can also recommend that new and redrilled wells be installed below the zone of contamination so that only clean water comes into the wells; and can notify U.S. EPA when a new permit is issued in the area. When EPA is notified that a new well permit is issued, EPA can determine whether the well needs to be included in the groundwater monitoring program. If unacceptable levels of contaminants are found, EPA can implement appropriate contingency actions.

Comment LG-4: Please provide the Winnebago County Health Department and the Winnebago County Regional Planning and Development Department with a letter specifying how Winnebago County can assist EPA in helping to prevent new well users and occupants of new construction from being exposed to unacceptable levels of groundwater and vapor contaminants during the cleanup, and a map showing the area of potential concern.

The map and letter should be sent to:

Larry Swacina, Environmental Director
Winnebago County Health Department
401 Division Street
Rockford, IL 61104

with a copy to:

Jackie DiGiacomo, Sanitarian
Winnebago County Health Department
Well and Septic Program
401 Division Street
Rockford, IL 61104

and:

Bob Urbanowicz, Building Official
Winnebago County Regional Planning & Economic Development
404 Elm Street, Rm. 301
Rockford, IL 61101

with copies to:

Charlene Coulombe, Director
Winnebago County Regional Planning & Economic Development
404 Elm Street, Rm. 301
Rockford, IL 61101

and:

Jacqueline Boerma
Winnebago County Regional Planning & Economic Development
404 Elm Street, Rm. 301
Rockford, IL 61101

Jackie DiGiacomo, the Winnebago County Health Department Sanitarian and Bob Urbanowicz, the Winnebago County Regional Planning & Economic Development Building Official are the contacts for the site. Jackie DiGiacomo may be reached at (815) 720-4127 and Bob Urbanowicz may be reached at (815) 987-3093.

EPA Response LG-4: In the upcoming months EPA will work with Winnebago County to provide the county with the information it needs to be able to assist EPA in the cleanup, and will provide the county with periodic updates as additional sampling data is generated.

With regards to the Winnebago County Regional Planning & Economic Development Department, EPA is asking the department to notify EPA when the department issues a permit for new construction in the area (e.g., the 1-mile tract of farmland between Rockton Road and McCurry Road). This will allow EPA to determine whether vapor intrusion may be an issue in the areas under construction and whether additional evaluation is warranted.

3.2.2 Community Issues (CI Comments)

Comment CI-1: *The area directly west of the contaminated groundwater plume has not been sufficiently tested to rule out the possibility of contamination. There was very little testing in the area of Tresemer Road and Valerie Road when the contamination was first discovered and in recent years. EPA's records indicate that the area has not been tested since 1998, and that before 1998, there was only sporadic testing in the area even though there was some early indication that the area was contaminated. EPA's study shows that the TCE numbers are decreasing and it is possible that this area was among the first areas to have hazardous levels of contamination that have now decreased to "normal" levels.*

EPA Response CI-1: EPA regrets any confusion during the public meeting about the areas that were tested after 1998. EPA's records indicate that since 1990, 33

residential wells in the area of Tresemer Road and Valerie Road were tested for groundwater contamination. The homes that were tested include homes on the western edge of the groundwater contamination and homes adjacent to and outside the western area of groundwater contamination. According to EPA's records, 14 homes on Valerie Road, 16 homes on Tresemer Road, 1 home on Tresemer Court, 1 home on Rae Ann and 1 home on Doreen were tested for contamination. The homes that were tested and the TCE and PCE results are shown in the Groundwater Data Evaluation Report in Figures 4-1, 4-2, 4-3, 4-5 and 4-6, and in Appendix F, Appendix H and in Table 5-4 of Appendix I. The homes that EPA connected to the North Park Water Supply are shown in Figure 3-3 of the Groundwater Data Evaluation Report. The testing results are discussed in more detail at the end of this response.

Sampling at over 300 homes in the residential area and groundwater flow mapping using groundwater elevation measurements from monitoring wells across the site (see Figures 3-2, 5-10 and Section 3.7 in the Groundwater Data Evaluation Report) show that the groundwater and groundwater contaminants are flowing from the industrial area near Route 251 and Rockton Road southwest to the Rock River. As shown in Figure 5-10, the highest contaminant concentrations are along Blue Spruce Drive, Francis Lane and Hayloft. Based on contaminant concentrations and groundwater flow mapping, homes located in the area of Valerie Road and Tresemer Road are outside or are on the western edge of the contaminated area. Groundwater and any contaminants flowing through the area of Valerie Road and Tresemer Road are flowing parallel to the main path of the contamination. As a result, although contamination in the area of Valerie Road and Tresemer Road could have been higher at some point, these areas were never exposed to the highest levels of contaminants that would have been seen in other areas of the site.

Please see EPA Response LG-2 for additional details concerning the groundwater and residential well sampling and long-term monitoring that EPA will conduct to ensure that residential wells remain unaffected during the cleanup.

A summary of the testing results for the area of Valerie Road and Tresemer are discussed below:

Valerie Road

From 1990 to 1998, 10 homes on Valerie Road were sampled (Figures 4-1 to 4-3 and Appendix H). 4 homes had low levels of contaminants below drinking water standards and 1 home had TCE at the drinking water standard of 5 ug/l. In 1999-2000 EPA connected the 5 homes where contaminants were detected to the North Park Water Supply.

In 2000-2001, EPA and the Illinois Department of Public Health (IDPH) sampled 5 more homes on Valerie Road (Figures 4-5, 4-6 and Appendices F and Table 5-4 of Appendix I). Four of the homes were outside the connected area and were homes that had not been previously sampled. Three of these homes were adjacent to the connected area and 1 home was on the opposite side of the street 2 homes west of the connected areas. The other home sampled was in the connected area and had a well in which contaminants were previously detected. This well was sampled before the well was sealed as part of the North Park water hook-up.

The 2000-2001 testing confirmed that homes just outside the connected area were uncontaminated. The testing also showed that the low levels of contaminants in the well that was in the contaminated area decreased even further. In 1994, this well had 1 ppb of TCE and 10 ppb of 1,1,1-TCA. In 2000, the well did not contain any TCE, and the level of 1,1,1-TCA had decreased to 1 ppb. The drinking water standard for 1,1,1-TCA is 200 ppb.

Tresemer Road

From 1990 to 1994, 12 homes on Tresemer Road were sampled (Figures 4-1 to 4-3 and Appendix H). No TCE was found in any of the wells. Ten wells had low levels of 1,1,1-TCA less than 10 ppb. These concentrations were significantly below the drinking water standard for 1,1,1-TCA of 200 ppb. In 1999-2000 EPA connected 9 of the homes where 1,1,1-TCA was detected to the North Park Water Supply. EPA did not connect the other home with 1,1,1-TCA to the North Park Water Supply because the concentration of 1,1,1-TCA in this well was only 1 ppb.

In 2000 - 2001, EPA and IDPH sampled 6 more homes on Tresemer Road (Figures 4-5, 4-6 and Appendices F and Table 5-4 of Appendix I). Four of the homes were outside the connected area and were homes that had not been previously sampled. These homes were immediately west of the connected area. The other 2 homes sampled were in the connected area and had wells in which low levels of 1,1,1-TCA were previously detected. These 2 wells were sampled before they were sealed as part of the North Park water hook-up.

The 2000-2001 testing showed that the 2 homes on Tresemer Road in the connected area where low levels of 1,1,1-TCA were found in 1993-1994 were no longer contaminated. The sampling also confirmed that the homes on Tresemer Road just west of the connected area were also uncontaminated. Low levels of toluene were found in some of the samples at concentrations of 1 - 2 ppb. However, toluene was also found in EPA's quality control samples and the toluene found in the residential well samples is most likely from laboratory contamination. The drinking water standard for toluene is 1,000 ppb.

Tresemer Circle, Doreen and Rae Ann

In 1990-1993, 3 homes - 1 on Tresemer Circle, 1 on Doreen and 1 on Rae Ann - were sampled (Figures 4-1 to 4-2 and Appendix H). No contaminants were detected in any of these wells.

Comment CI-2: *I am concerned about the current water supply now that 281 private wells in the area have been sealed. Will the loss of groundwater use from these wells impact groundwater flow and contaminant transport to private wells outside the connected area?*

EPA Response CI-2: Because the aquifer at and around the Evergreen Manor site is a highly productive sand and gravel aquifer that yields a substantial supply of groundwater, closing 281 residential wells in the area is not expected to have any discernable effect on groundwater flow or contaminant transport to the other residential wells in the area.

A typical 4-person household uses about 300 to 400 gallons of water per day (about 0.25 gallons per minute) and has 1 well per property. This flow rate is significantly lower than the estimated sustainable well yields in this area which can exceed 20 gallons per minute per foot of pumped aquifer for a typical residential well. These low household pumping rates compared to the amount of groundwater that is available are expected to result in negligible aquifer effects with no resulting change to local groundwater flow. In other words, the groundwater underlying properties with residential wells around the site area is expected to be sufficient for each home's use without drawing in water from the contaminated area.

U.S. EPA's estimates also indicate that closing off 281 wells in the connected area and discharging North Park water into the septic systems of those homes also would not significantly alter the water table or groundwater flow. Again, this is because of the high permeability of the aquifer in this area and because the 281 septic systems are spread out over an area almost 1 mile long by ½ mile wide.

However, EPA's cleanup plan for the Evergreen Manor site includes installing about 11 piezometers across the site to confirm current groundwater flow conditions and to help identify areas where groundwater contaminants may remain (see Section 2.11.1 and Appendix G, Section 7.2.1 of the ROD and Figure 7-1 in the Groundwater Data Evaluation Report). A piezometer is similar to a groundwater monitoring well, but is generally narrower and is used for measuring groundwater elevations, not chemical sampling. The final number and locations of the piezometers will be determined during the remedial design phase.

EPA will use the data collected from the piezometers with groundwater elevation data from existing groundwater monitoring wells to assist in developing the additional sampling and long-term groundwater and residential well monitoring programs. This will help ensure that sampling and monitoring is conducted in areas to where contaminants are most likely to be or may be transported.

Comment CI-3: *The Rock River has many bends and curves but EPA is only considering that the contamination is flowing in a straight line.*

EPA Response CI-3:

EPA's conclusion that groundwater and groundwater contaminants are flowing from the industrial area near Route 251 and Rockton Road southwest to the Rock River is based on sampling at over 300 homes in the residential area and groundwater flow mapping using groundwater elevation measurements from monitoring wells across the site (see Figures 3-2, 5-10 and Section 3.7 in the Groundwater Data Evaluation Report). These figures show that groundwater and groundwater contaminants are flowing southwest toward the river. As indicated in EPA Response CI-2, EPA also plans on installing additional piezometers throughout the area to monitor groundwater flow during the cleanup.

Comment CI-4: *Not enough attention has been given to the area of Tresemer Estates (the area of Valerie Road and Tresemer Road). There have been a number of people in the neighborhood that have suffered from cancer and I wonder if the water they have been drinking and bathing in could be the cause. Please provide more information about the potential health effects of TCE and PCE.*

EPA Response CI-4: Please see EPA Response CI-1 concerning sampling and contaminant concentrations in the area of Valerie Road and Tresemer Road. PCE was not detected in this area, and TCE was either not detected or was detected at concentrations at or below drinking water standards. 1,1,1-TCA was also detected in some wells in this area, but at concentrations well below drinking water standards.

The area of Valerie Road and Tresemer Road is outside or on the western edge of the groundwater contamination. Groundwater and any contaminants flowing through the area of Valerie Road and Tresemer Road are flowing parallel to the main path of the contamination. Although contamination in the area of Valerie Road and Tresemer Road could have been higher at some point in the past, these areas were never exposed to the highest levels of contaminants that would have been seen in other areas of the site.

Detailed information about the potential health effects of TCE (also called trichloroethylene or trichloroethene) and PCE (also called tetrachloroethylene or tetrachloroethene) is available from the Agency for Toxic Substances and Disease Registry (ATSDR) website at www.atsdr.cdc.gov. The potential health effects of these chemicals are summarized below:

TCE:

Breathing small amounts of TCE may cause headaches, lung irritation, dizziness, poor coordination and difficulty concentrating. Breathing large amounts of TCE may cause impaired heart function, unconsciousness and death. Breathing TCE for long periods may cause nerve, kidney and liver damage.

Drinking large amounts of TCE may cause nausea, liver damage, unconsciousness, impaired heart function or death. Drinking small amounts of TCE for long periods may cause liver and kidney damage, impaired immune system function, and impaired fetal development in pregnant women, although the extent of some of these effects is not yet clear.

Skin contact with TCE for short periods may cause skin rashes.

Some studies with mice and rats suggest that high levels of TCE may cause liver, kidney or lung cancer. Some studies of people exposed over long periods to high levels of TCE in drinking water or workplace air have found evidence of increased cancer. Although there are some concerns about the studies of people who were exposed to TCE, some of the effects found in people were similar to effects in animals.

In its 9th Report on Carcinogens, the National Toxicology Program determined that TCE is "reasonably anticipated to be a human carcinogen." The International Agency for Research on Cancer has determined that TCE is "probably carcinogenic to humans."

PCE

High concentrations of PCE (particularly in closed, poorly ventilated areas) can cause dizziness, headache, sleepiness, confusion, nausea, difficulty in speaking and walking, unconsciousness, and death.

Irritation may result from repeated or extended skin contact with PCE. These symptoms occur almost entirely in work or hobby environments when people have been accidentally exposed to high concentrations or have intentionally used PCE to get a "high."

In industry, most workers are exposed to PCE levels that are lower than those causing obvious nervous system effects. The health effects of breathing in air or drinking water with low levels of PCE are not known.

Results from some studies suggest that women who work in dry cleaning industries where exposures to PCE can be quite high may have more menstrual problems and spontaneous abortions than women who are not exposed. However, it is not known if PCE was responsible for these problems because other possible causes were not considered.

The results of animal studies, conducted with amounts of PCE much higher than those that most people are exposed to show that PCE can cause liver and kidney damage. Exposure to very high levels of PCE can be toxic to the unborn pups of pregnant rats and mice. Changes in behavior were observed in the offspring of rats that breathed high levels of PCE while they were pregnant.

The Department of Health and Human Services has determined that PCE may reasonably be anticipated to be a carcinogen. PCE has been shown to cause liver tumors in mice and kidney tumors in male rats.

Comment CI-5: *There needs to be a health study to determine how the contamination has impacted the health of area residents. Even if the levels of groundwater contaminants are now within safe drinking water levels, the previous contamination in the area could have or may still be the cause of many serious health conditions.*

EPA Response CI-5: Please see EPA Response CI-4 for more information about the health effects of TCE and PCE. There is also a National Exposure Registry study of self-reported effects of TCE exposure available on the Agency for Toxic Substances and Disease Registry (ATSDR) website at www.atsdr.cdc.gov/NER. ATSDR also has an information center (1-888-422-8737) that residents can contact to find doctors who specialize in treating illnesses caused by chemical exposure in their area. Upon request, ATSDR will also come out to Roscoe to meet with residents to discuss the health effects of TCE and PCE exposure. Please contact Mr. Mark Johnson of ATSDR toll free at 1-800-621-8431 Ext. 33436 or via email at johnson.mark@epa.gov to request a health effects meeting.

ATSDR is also the agency that conducts health studies. Health studies are not conducted by EPA. ATSDR has 7 criteria for determining whether a health study should be conducted. They are:

- Public health significance
- Community perspective and involvement
- Scientific importance
- Ability to provide definitive results
- Availability of resources
- Contribution to program goals
- Authority and support

A copy of ATSDR's "Guidance for ATSDR Health Studies" is available on ATSDR's website at www.atsdr.cdc.gov. Click on "Index" and then click on the letter "H". The guidance is listed under "Health Studies, Guidance for ATSDR." Requests for health studies may be submitted to:

Dr. David Williamson, Director
Agency for Toxic Substances and Disease Registry
Division of Health Studies
1600 Clifton Rd., NE, Mailstop E-31
Atlanta, Georgia 30333
(404) 498-0105 or toll-free at 1-888-422-8737

Comment CI-6: *(Two residents had this comment): The groundwater contamination should not be allowed to naturally attenuate. Regardless of the cost difference, the groundwater contamination should be cleaned up as quickly as possible and paid for by the responsible parties. Any additional exposure to these chemicals puts human life and quality of life at risk, and poses a risk to people's pets. The time difference of 15 years for natural attenuation compared to 8 years for a groundwater pump and treat remedy is totally unacceptable since the community has already been exposed to these chemicals for far too long already.*

EPA Response CI-6: EPA is selecting monitored natural attenuation as the site remedy because the previous municipal water hook-up, local groundwater use controls, monitoring and contingency actions make this cleanup option just as protective as the groundwater pump and treat alternative. Groundwater and residential well data collected from 1990 to 2002 also indicates that most of the groundwater contamination has already decreased to below drinking water standards. With the municipal water hook-up, monitoring and contingency actions, EPA's monitored natural attenuation cleanup plan will be an effective way to protect people from being exposed to unsafe levels of groundwater contaminants, and a groundwater pump and treat system is not warranted.

In 1999-2000, EPA connected 281 homes with contaminated and threatened wells to the North Park water supply. The groundwater and residential well sampling conducted throughout the cleanup will also verify that the remaining private wells in the area are not contaminated. If unacceptable levels of site-related contaminants are found in private wells, EPA will take additional actions, such as installing individual treatment units at homes or connecting more homes to the North Park water supply to prevent people from being exposed to hazardous levels of contamination.

Also, EPA would like to clarify that the cleanup time of 15 years for the monitored natural attenuation option given in the proposed plan was incorrect. The estimated cleanup time for the monitored natural attenuation alternative is 12 years (cleanup complete by 2015), not 15 years (2018). This mix-up occurred because the monitored natural attenuation alternative assumes that groundwater monitoring would continue for 3 years after the cleanup levels were attained. EPA would conduct this additional monitoring to make sure that contaminant concentrations stayed below the cleanup levels permanently. As a result, the proposed plan mistakenly stated the cleanup time was 15 years (12 years + 3 years) instead of the correct 12 years.

Finally, EPA would also like to note that the $2.1 million North Park water hookup was paid for by three companies that are potentially responsible for the groundwater contamination: Waste Management, Ecolab and Regal-Beloit. EPA also hopes that these same companies will agree to conduct and pay for the monitored natural attenuation cleanup plan. Any sampling and monitoring activities conducted by the potentially responsible companies will be performed under EPA and IEPA oversight.

Comment CI-7: *I live on Rollingsford Lane and am concerned about the water supply in our private well. In the 10 years since we have been living in our home, our water has never been tested. If the houses next to and behind our home were contaminated and are now connected to the municipal water supply, how do we know that our well has not been affected? EPA's cleanup plan should include testing at homes around the site in case the contamination has spread. Please provide any testing results EPA has for the area of Rollingsford Lane.*

EPA Response CI-7: EPA's records indicate that 2 homes directly west of this resident's home (closer to the contaminated area), 2 homes directly southeast of this resident's home, and 1 home directly north of this resident's home (upgradient) were sampled for VOCs and were found to be uncontaminated.

According to EPA's records, 5 homes on Rollingsford Lane and 4 other nearby homes - 3 on Winchester and 1 on Straw - were tested for VOCs. The homes that were tested and the TCE and PCE results are shown in the Groundwater Data Evaluation Report in Figures 4-1, 4-2, 4-3, 4-5 and 4-6, and in Appendix F and Appendix H.

In 1990 and 1991, 5 homes on Rollingsford Lane and 4 other nearby homes - 3 on Winchester and 1 on Straw - were sampled for VOCs (Figure 4-1, 4-2 and Appendix H). One of the homes - the home on the west side of Winchester at the intersection of Winchester of and Rollingsford Lane - had TCE at a concentration of 1 ppb. This concentration was below the drinking water standard for TCE of 5 ppb. No other contaminants were found in that well and no contaminants were found in any of the other wells.

In 1999 the home on Winchester where the low level of TCE was detected in 1991 was resampled. The sampling showed that this well was no longer contaminated (Figure 4-3 and Appendix H). However, in 1999-2000, this home, 3 other homes on Winchester and 1 home on Rollingsford Lane located at the southeast intersection of Rollingsford Lane and Winchester were connected to the municipal water supply as a "buffer zone" (see Figure 2-1 in the Groundwater Data Evaluation Report). Although these homes were not contaminated, they were connected to the municipal water supply as a precautionary measure to allow for any fluctuations in the extent of the groundwater contamination in this area.

In 2001, a home directly north of this resident's house on the north side of Rollingsford was resampled. The testing showed that this well was still uncontaminated and confirmed that the contamination has not spread into this area (Figures 4-5, 4-6 and Appendix F). Also, please see EPA Response CI-1 for additional details concerning the additional testing and long-term groundwater and residential well monitoring programs and contingency plans that are included in EPA's final cleanup plan to ensure that residential wells in the area remain unaffected during the cleanup.

Comment CI-8: *It is not convenient or even possible for many people to attend the one-on-one availability sessions EPA held for the site since these sessions were held during the day.*

EPA Response CI-8: The February and August 2003 meetings that EPA held in Roscoe were both conducted in 2 sessions. One session was conducted in the afternoon and one session was conducted in the evening. The afternoon sessions are called availability sessions and are when EPA is available to meet area residents one-on-one to discuss the site and answer questions. The evening sessions are more formal public meetings and include a presentation and a general question and answer period. EPA also spoke one-on-one with some residents after the evening meetings while the meeting rooms were still available.

EPA planned the meetings in Roscoe this way so that residents who were not able to attend in the afternoon might be able to come in the evening, and so residents who could not attend in the evening might be able to come in the afternoon. Residents who can not attend either meeting are encouraged to contact EPA toll-free or via email with any questions or for more information about the site. EPA contacts for the site are:

Janet Pope
EPA Community Involvement Coordinator
1-800-621-8431 Ext. 30628
pope.janet@epa.gov

Karen Cibulskis
EPA Project Manager
1-800-621-8431 Ext. 61843
cibulskis.karen@epa.gov

Comment CI-9: *Only 4 homes were tested for soil vapors. Given the number of homes in the contaminated area, this sample size is not adequate for determining an appropriate action plan, particularly since the test results do not seem to be overwhelmingly conclusive one way or the other.*

EPA Response CI-9: EPA recognizes that there are some uncertainties associated with the vapor intrusion investigation. The vapor intrusion investigation was a one-time sampling event at only 4 of almost 300 homes in the area. Property and residence-specific factors (e.g., partial basement, multiple floors, fireplaces, landscaping) can influence indoor air concentrations, and there is some uncertainty as to whether the 4 residences EPA sampled provide a reasonable characterization of vapor intrusion in all the homes in the area. Also, indoor air concentrations can be affected by seasonal variations (e.g., during the winter when homes are more tightly sealed, furnaces are running and the ground is frozen or covered by snow), and EPA's one-time sampling event may not provide an accurate assessment of longer-term average indoor levels.

Finally, without adequate groundwater data from locations at or near the water table, it is not certain that all of the contaminants EPA detected in soil gas are from the groundwater, or if they are from other sources such as septic systems. Similarly, at homes with attached garages and/or petroleum or other chemical-containing products in the home, it is not certain to what extent contaminant concentrations found in the home are household-related and which may be site-related.

Because of this, EPA's final cleanup plan includes additional shallow groundwater and soil gas sampling throughout the area (see Section 6.5 and 7.2.2 in Appendix G of the ROD) to target a statistically significant number of homes for vapor monitoring to verify that potential site-related risks from the vapor pathway remain below acceptable levels during the groundwater cleanup. EPA currently anticipates that vapor monitoring will be conducted at about 25 homes four times a year (winter, spring, summer and fall). After the results of the first year, EPA will review the results of the sampling and may modify the monitoring program to add or remove homes from the program. EPA will continue vapor monitoring until it is clear that site-related vapors will remain below acceptable levels. The details of the final vapor monitoring program will be developed during the remedial design phase and will be based on the results of the initial shallow groundwater and soil gas sampling (see Section 2.11.1 of the ROD).

Comment CI-10: *How and when did EPA select the 4 homes for the April 2002 vapor intrusion investigation? Did EPA go door-to-door? If EPA went to homes during the day, only a few people would have been home.*

EPA Response CI-10: Before selecting the 4 homes for vapor sampling, EPA targeted over 50 homes in the area that were located close to groundwater monitoring wells and were in the 4 general areas that EPA had current groundwater data for (see Figure 5-1 in the Air Sampling Report). EPA and the Winnebago County Health Department then went door-to-door to each of these homes during the late afternoon and evening for 2 days to see which homeowners would be willing to have their homes tested. On the first day EPA was out in the area from 4:00 pm to 9:00 pm. On the second day EPA was out in the area from 4:00 to 7:30. Twenty-seven homeowners spoke to EPA. The other 24 homeowners were either not home or did not respond. Of the 27 homeowners EPA spoke with, 13 were willing to have their home tested.

The 13 homeowners who were willing to have their home tested were asked to fill out a detailed survey. The purpose of the survey was to help EPA identify homes where household-related activities such as smoking, home improvement projects, chemical products stored in basements or other hobbies could interfere with the testing results, and to identify homes that had sump pumps and foundation cracks through which vapors are more likely to migrate. Based on the survey results EPA selected 1 home in each of the 4 areas for testing.

Comment CI-11: *If the additional testing EPA conducts as part of the monitored natural attenuation cleanup plan shows that the groundwater contamination and soil vapors are worse than originally indicated, how will EPA modify the cleanup plan? Will groundwater pump and treat become an option again?*

EPA Response CI-11: EPA's monitored natural attenuation cleanup plan includes contingency actions that will be implemented if monitoring identifies the need for modifications or changes in the remedy (see Section 2.11.1 of the ROD). EPA will consider whether contingency actions need to be implemented if:

- The monitoring data indicates that contaminant levels are not continuing to decline as estimated in the modeling predictions (EPA currently anticipates that the groundwater will attain drinking water levels in about 12 years);
- EPA finds additional groundwater contaminants or significantly higher levels of contaminants in the groundwater;

- The area of groundwater contamination is expanding or groundwater contaminants are moving underneath and beyond the Rock River;
- Site-related soil vapors do not remain below acceptable risk-based levels;
- New wells are installed in contaminated areas or areas that may be contaminated;
- Groundwater contaminants are detected in private wells;
- Undeveloped areas of the site are developed;
- The groundwater monitoring indicates that there may be unacceptable impacts to the Rock River;

Contingency actions include:

- Confirmation sampling;
- Collecting samples more frequently;
- Contaminant fate and transport modeling;
- Human health and ecological risk assessment;
- Collecting surface water and/or sediment samples from the Rock River;
- Temporary well point sampling/vertical profiling, or other characterization activities;
- Installing new monitoring wells;
- Adding locations to the vapor monitoring program or modifying the vapor monitoring program;
- Adding private wells to the groundwater monitoring program;
- Notifying the Winnebago County Health Department of changes in the extent of the contaminated groundwater plume and of changes in chemical concentrations within the plume;
- Installing venting systems at homes where site-related vapors do not remain below acceptable levels;
- Conducting a source area investigation;
- Evaluating whether additional response actions, such as constructing a groundwater pump and treat system, installing treatment units at individual private wells, connecting additional homes to the North Park water supply, or remediating source area(s) are necessary; and
- Implementing additional response actions.

Comment CI-12: *EPA's proposed cleanup plan indicates that venting systems will be installed at homes with hazardous levels of site-related vapors. Please provide more information about the venting systems. How much do they cost? How do they function? Are they available even if a home tests "safe"? Are they recommended even if a home tests "safe"?*

EPA Response CI-12: The venting systems that would be installed in homes with hazardous levels of site-related vapors would be similar to those used for reducing radon levels in a home. These systems usually cost between $800 and $2500, with an average cost of $1200. The type of system that would be installed would depend on a home's foundation type(s). In houses that have a basement or a slab-on-grade foundation (concrete poured at ground level), there are 4 types of systems that can be used. These systems draw soil vapors from below the house and vent them through a pipe to the air above the house where they are quickly diluted and are summarized

below. Additional information about these systems can be found at www.radonfixit.org and www.epa.gov/iaq/radon/pubs.

- **Subslab suction**: The most common and usually the most reliable vapor reduction method. Suction pipes are inserted through the floor slab into the crushed rock or soil underneath. They also may be inserted below the concrete slab from outside the house. The number and location of suction pipes that are needed depends on how easily air can move in the crushed rock or soil under the slab, and on the strength of the vapors source. Acting like a vacuum cleaner, a fan connected to the pipes draws soil vapors from below the house and releases them into the outdoor air. Passive subslab suction is the same as active subslab suction except that it relies on natural pressure differentials and air currents instead of a fan to draw vapors up from below the house. Passive subslab suction is generally not as effective in reducing high vapors levels as active subslab suction.

- **Drain tile suction:** Some houses have drain tiles to direct water away from the foundation of the house. Suction on these drain tiles is often effective in reducing vapors levels if the drain tiles form a complete loop around the foundation.

- **Sump hole suction:** Often, when a house with a basement has a sump pump to remove unwanted water, the sump can be capped so that it can continue to drain water and serve as the location for a vapors suction pipe.

- **Block wall suction:** Block wall suction can be used in basement houses with hollow block foundation walls. This method removes vapors from the hollow spaces within the basement's concrete block wall. It is often used together with subslab suction.

Under Superfund law, EPA can only install venting systems at homes where the level of site-related vapors has the potential to cause more than 1 additional case of cancer for every 10,000 people similarly exposed or other harmful health effects. However, these types of venting systems and the contractors that install them are commonly available and can be installed by homeowners at their own expense. The decision to install a venting system at a home where the levels of site-related vapors do not exceed EPA's action levels can only be made by homeowners based on the level of risk they are comfortable with.

Comment CI-13: *How will EPA select the homes for further vapor monitoring?*

EPA Response CI-13: The final details of how EPA will select the homes for vapor monitoring will be developed during the remedial design phase. However, EPA currently anticipates that EPA's first step will be to characterize the extent and concentrations of shallow groundwater and soil gas contaminants in the area. This would be done by collecting additional soil vapor and shallow groundwater samples at about 50 locations throughout the subdivisions (20% of homes). EPA would then use these results to target about 25 homes for long-term vapor monitoring. EPA anticipates that most of the target homes would be in areas having the highest levels of groundwater and soil gas contamination. If indoor air samples are collected, EPA would also try to target the best homes to sample (e.g., homes with sump pumps that would allow vapors to infiltrate into the home, homes without attached garages that might bias results, etc.). The actual number and locations of the initial shallow

groundwater and soil gas samples could be more or less and would depend on initial sampling results. Similarly, the results of the shallow groundwater and soil gas sampling may also indicate that the final vapor monitoring program does not need to be that extensive.

Comment CI-14: *What are the obligations and ramifications of having my home tested? I bought my home 3 years ago. At that time it was disclosed that EPA had found the well to be contaminated and the homes were all hooked up to public water. I believed the matter to be closed. Was the investigation re-opened? It was not disclosed to me that there was a potential for hazardous vapors to be entering my home. Am I required to disclose this continued cleanup project in the event that I decide to sell my home? If I choose to participate in vapor testing, what are my obligations in the event that the test shows my home to be 'safe'?*

EPA Response CI-14: If your home is located in a targeted testing area and you agree to let EPA sample your home, your obligations to EPA would be to allow EPA's sampling team access to your property to set up and retrieve the sampling equipment, and to allow EPA to display the sampling results on maps, but without linking specific test results to your numerical address. EPA would also ask that you respond truthfully to any questions the sampling team asks (e.g., is smoking allowed in your home?), and to follow any instructions given at the time of sample collection (e.g., please do not park in your garage, please remove chemical products to an outside storage area, etc.). If EPA found hazardous levels of site-related vapors in your home, your home would be eligible to receive a venting system or other remedial measures under the Superfund program.

EPA's Evergreen Manor investigation was not closed and re-opened. When EPA connected residents to the North Park water supply, EPA also began an investigation to characterize and develop potential cleanup alternatives to address the remaining groundwater contamination at the site. EPA's overall involvement in the site will not end until EPA confirms that the groundwater has been returned to a useable source of drinking water and that potential risks from site-related vapors remain below acceptable levels.

EPA recommends that you consult with a real estate lawyer knowledgeable about the disclosure obligations in Illinois for more information about what site information would need to be disclosed if you sell your home.

Comment CI-15: I built a home on the south side of Valerie Street between Tresemer Road and Wagon Lane. I lived in this home with my son during the worst years of the contamination and had cancer in 2000. Since 1992 I have been renting out the property and the contaminated water and/or the vapors from it are dangerous to my tenants. Please test as many homes as possible to get a true measurement of the vapor hazard. I will gladly volunteer my home for testing.

EPA Response CI-15: EPA notes that this property owner is willing to have his or her home included in the vapor testing program. Please see EPA Response CI-13 for additional information about the anticipated process for selecting homes for vapor testing. Vapor monitoring and contingency actions will ensure that residents are not exposed to unacceptable levels of site-related vapors levels during the cleanup.

EPA would also like to note that the well at this property was tested once in 1994 and contained TCE at a concentration of 1 ppb and 1,1,1-TCA at 8 ppb. These concentrations are below the drinking water standards for these chemicals (5 ppb for TCE and 200 ppb for 1,1,1-TCA). In 1999-2000, EPA connected this house to the North Park water supply and permanently sealed this well. Sampling at over 300 homes and groundwater flow mapping show that this property is on the western edge of the contaminated area, not in the main path of the contamination. Please see EPA Response CI-1 for more detailed information about sampling and contaminant concentrations in the area of Valerie Road.

Comment CI-16: *Many residents are depending on EPA to address the remaining groundwater and soil vapor contamination at the site. Please use all of your available resources to identify everyone affected by groundwater and/or vapor contamination. I am willing to have my home tested. Please keep the community regularly informed of EPA's progress through mailings, availability sessions and meetings.*

EPA Response CI-16: Please see EPA Responses CI-1 and CI-13 for additional information about the additional testing and long-term groundwater, residential well and vapor monitoring programs and contingency actions that EPA will implement to ensure that residents are not affected by groundwater contaminants or site-related soil vapors during the cleanup. EPA notes that this property owner is willing to have his or her home tested. Please see EPA Responses CI-1 and CI-13 for additional information about the anticipated processes for selecting homes for groundwater and vapor testing.

EPA will continue to update residents through periodic mailings and meetings. EPA also encourages residents to contact EPA toll-free or via email for brief updates about the site or with any questions. EPA contact information is provided in EPA Response CI-8.

3.2.3 PRP Comments (PRP Comments)

Comment PRP-1: *GROUNDWATER IS NOT USED IN HOMES AT EVERGREEN MANOR AND SO THERE IS NO RISK FROM GROUNDWATER INGESTION, DERMAL CONTACT, OR INHALATION FROM SHOWERING OR WASHING CLOTHES. In 1999-2000 (Proposed Plan), EPA successfully completed a remedy to hook up local Evergreen Manor residences to a municipal potable water supply. In addition, an institutional control by way of a local prohibition against construction and use of groundwater wells was promulgated in 1999 (GDER, 2003, Appendix G). The combination of these two final remedies effectively eliminated exposure to groundwater contaminants to the extent elevated concentrations were ever observed. Nevertheless, EPA's contractor ignored EPA's own remedy to assume a hypothetical exposure pathway where none exists. Had the risk assessment been conducted in accordance with the NCP and EPA guidance and properly considered the completed remedy: no risk from the Site exists because no one is exposed to groundwater. The reliance on this exposure pathway is diametrically opposed to the position expressed in the Remedial Investigation, which states: "The result of this removal action is that it has effectively deleted the residential well exposure route pathway that was discussed in the human health risk assessment. Thus, since the exposure pathway has been eliminated, the associated human health risk has also been eliminated." (2001 RI, Section 11, p. 6).*

EPA Response PRP-1: As discussed in the Preamble to the NCP (Federal Register Vol. 55, No. 46, March 8, 1990, p. 8710-8711):

> *The role of the baseline risk assessment is to address the risk associated with a site in the absence of any remedial action or control, including institutional controls. The baseline risk assessment is essentially an evaluation of the no-action alternative...The effectiveness of the institutional controls in controlling risk may appropriately be considered in evaluating the effectiveness of a particular remedial alternative, but not as part of the baseline risk assessment.*

EPA's baseline risk assessment for the Evergreen Manor site (see ROD Section 2.7.1) indicates that using the groundwater at the site would pose an unacceptable risk. More than 73 residences in the site area still obtain their water from private wells, and municipal water is only available in certain areas (see ROD Figures 7 and 8). Because the current horizontal and vertical extent of the Evergreen Manor groundwater contamination is somewhat uncertain, EPA's selected remedy is needed to verify that private wells are not impacted above acceptable levels and that new well users in areas where municipal water is not available (and where new wells will be permitted) will not be exposed to unacceptable levels of contaminants.

The RI/FS is not complete until EPA issues a ROD for the site. The Evergreen Manor ROD is based on the RI as well as the more recent sampling and analysis presented in the Groundwater Data Evaluation Report and the Air Sampling Report, as well as other information in the Administrative Record.

Comment PRP-2: *THE REVISED RISK ASSESSMENT IS BASED ON AN ERRONEOUS, UNREPORTED, OR HYPOTHETICAL TCE CONCENTRATION. On August 26, 2003, EPA released a letter that contained a one-page addendum to Section 9, Risk Assessment, of the Weston 2001 Remedial Investigation Report (Weston, 2001). This addendum, titled "Recalculated cancer risk for adult exposure to groundwater using reasonable maximum exposure assumptions in 2001 risk assessment with revised toxicity values TCE and PCE and 2002 groundwater data" was a series of risk re-calculations for an adult hypothetically exposed to groundwater. It incorrectly assumed that no remedy had been implemented at the Site and local groundwater was a source of risk via ingestion, dermal contact and inhalation. A groundwater concentration of 0.0079 (units not provided, but assumed to be milligrams per liter (mg/L)) was used. This concentration could not be found in the Evergreen Manor groundwater database for any sampling event, including 2002 groundwater data as stated in the title. Indeed this datum is higher than any of the TCE or PCE concentrations ever reported by EPA in the 2002 data set but was nevertheless used to represent the TCE concentration across the entire Site. The highest groundwater concentration for TCE in the Evergreen Manor database was 0.0072 (J) mg/L. This value is marked with a "J" qualifier indicating the value was not accurately measured but estimated. A single estimated data point to represent an area should not be used for the purposes of quantitatively estimating risk and for selecting a final Site remedy. The highest unqualified, accurately measured, TCE concentration at this Site was 0.0047mg/L. This concentration is below the Maximum Contaminant Level (MCL) for TCE and therefore the Site is in compliance with the groundwater ARAR for TCE.*

EPA Response PRP-2: See EPA Response PRP-1. The actual reported TCE concentration is 0.0072 mg/l not 0.0079 mg/l. The data was qualified with a "J" which means that the chemical was positively identified but that the concentration is estimated. As indicated in EPA's Risk Assessment Guidance for Superfund Part A (RAGS) (p. 5-15):

> *...most of the laboratory qualifiers for both inorganic chemical data and organic chemical data (e.g., J, E, N) indicate uncertainty in the reported concentration of the chemical, but not in the assigned identity. Therefore, these data can be used just as positive data with no qualifiers or codes. In general, include data with qualifiers that indicate uncertainties in concentrations but not in identification.*

Calculating the risk using a TCE concentration of 0.0072 mg/l results in a TCE and PCE risk of 1.8 x 10-4 instead of 1.9 x 10-4 (see ROD Appendix K). This risk is still above EPA's acceptable risk range of 1 x 10-4 to 1 x 10-6. Also, because cancer risk estimates should be expressed using one significant figure only (RAGS p. 8-12), the resulting total cancer risk would still be 2 x 10-4.

EPA used maximum detected concentrations to represent the reasonable maximum exposure point concentration because EPA assumed that water could be drawn from anywhere in the aquifer (RAGS, p. 6-27). Also, the location of the center of the plume, horizontally and vertically, is unclear, and chemical concentrations in the groundwater (and the resulting risk) could actually be higher than calculated. Almost all of the existing groundwater monitoring wells scattered across the 2-mile site (27 wells at 17 locations) were installed at predetermined depths and locations without the use of temporary well point transects or vertical profiling, and groundwater monitoring wells and vertical profiling locations do not correspond well with areas where contaminants were historically located (ROD Figure 2). Because only generally low levels of contaminants have been detected in the monitoring wells, it is not certain if groundwater concentrations have decreased to the extent indicated, or if the wells are located to accurately portray the plume (see ROD Appendix G).

The NCP Preamble specifies (p. 8713) that cleanup levels (e.g., MCLs) "should generally be attained throughout the contaminated plume." The current groundwater monitoring well network and CPT locations can not be used to make this determination with any certainty. The temporary well point sampling and vertical profiling included in EPA's selected remedy will be used to identify areas where groundwater contaminants remain above cleanup levels and where additional long-term monitoring is necessary.

As indicated in the August 2003 risk update spreadsheet, the parameters used to evaluate the risks were consistent with those in the Risk Assessment in Section 9 and Appendix A of the 2001 RI Report.

Comment PRP-3: *THE MAXIMUM DETECTED GROUNDWATER CONCENTRATION SHOULD NOT HAVE BEEN USED FOR ESTIMATING RISK AND REMEDIAL DECISION MAKING. THE USE OF AN AVERAGE CONCENTRATION IS APPROPRIATE UNDER US EPA'S GUIDANCE DOCUMENTS. The 2002 data set establishes that no PCE in the residential area exceeds EPA's MCL. Indeed, the closest groundwater monitoring point with an observed PCE accedence is located over 5,000 feet away from Evergreen Manor. Moreover, this sole MCL exceedence of 5.9 µg/L for PCE was only marginally above the MCL and was observed in a monitoring well not a*

well used to supply potable water. Nevertheless, EPA's contractor inappropriately applied this highest point concentration across the entire Site as the input concentration for purposes of re calculating Site risks. As stated in its guidance, "EPA recommends using the average concentration to represent 'a reasonable estimate of the concentration likely to be contacted over time' (EPA 1989) and ..."because of the uncertainty associated with estimating the true average concentration at a site, the 95 percent upper confidence limit (UCL) of the arithmetic mean should be used for this [exposure point concentration] variable." (EPA 2002). EPA's contractor disregarded EPA's clearly stated requirements and used a maximum value to estimate risk and evaluate groundwater against Site groundwater goals. The only inferred objective for using the maximum is to show a risk where no unacceptable risk actually exists. The goal of a risk assessment is to accurately calculate the risks to a person over a long period of exposure using average exposure concentrations (EPA 1989). EPA requires the use of the 95 percent upper confidence limit of the mean for groundwater (EPA 1992) to calculate the concentration term for use in a risk assessment. If EPA's contractor had complied with EPA's own guidance and incorporated all of the data, even including the inaccurate "J" qualified data, a groundwater concentration of 0.0025 for TCE and 0.0035 for PCE should have been used. Both of these values are less than the MCL. Nevertheless, if these values had been used, the recalculated risk assessment would have shown risks of 7.47 x 10-5 which are well within the EPA's acceptable risk range of 1 in 1 million to 100 in one million (10-4 to 10-6) and no additional work would be required at the Site.

EPA Response PRP-3: See EPA Responses PRP-1 and PRP-2. EPA used maximum groundwater concentrations to represent the reasonable maximum exposure because residents may draw water from anywhere in the aquifer and because the location of the center of the plume, horizontally and vertically, is unclear. EPA's 2002 guidance, "Calculating Upper Confidence Limits for Exposure Point Concentrations at Hazardous Waste Sites" (OSWER 9285.6-10) does not have "clearly stated requirements" to use the 95% UCL for calculating reasonable maximum exposure. According to the guidance, exposure point concentrations (using the 95% UCL) should be calculated for each individual exposure unit within a site, which is defined as "the area throughout which a receptor moves and encounters an environmental medium for the duration of the exposure." Because current and future wells draw water from specific, limited areas of the aquifer and not from across the entire 2-mile plume, and because the remaining extent of the plume and contaminant concentrations within the plume is uncertain, using the 95% UCL to estimate a reasonable maximum exposure point concentration for groundwater exposure would not be appropriate. As Section 6 of EPA's 2002 guidance also states:

> *While the methods identified in this guidance may be useful in many situations, they will probably not be appropriate for all hazardous waste sites. Moreover, other methods not specifically described in this guidance may be most appropriate for particular sites.*

In addition, even if EPA did agree that it was appropriate to use the 95% UCL to represent reasonable maximum exposure point concentrations for groundwater exposure at the Evergreen Manor site, the spreadsheets and calculations for the 95% UCL concentrations provided in Comment PRP-3 were not included, so EPA can not verify the results, including whether a normal or lognormal distribution was appropriately assumed and whether the data was or was not appropriately transformed (OSWER 9285.7-08I, p. 4).

Also, as indicated in "Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions" (OSWER Directive 9355.0-30):

> *Where the cumulative carcinogenic site risk to an individual based on reasonable maximum exposure for both current and future land use is less than 10-4 and the non-carcinogenic hazard quotient is less than 1, action generally is not warranted...However, if MCLs or non-zero MCLGs are exceeded, action generally is warranted.*

As indicated in EPA Response PRP-2, the NCP Preamble specifies that cleanup levels (e.g., MCLs) "should generally be attained throughout the contaminated plume." Because residents may draw water from anywhere in the aquifer, averaging chemical concentrations across the plume is not a protective method for determining whether cleanup levels have been attained.

Comment PRP-4: *THE RE-CALCULATED RISK ASSESSMENT USES A CANCER SLOPE FACTOR FOR TCE THAT IS NEITHER ACCEPTED BY EPA NOR RECOGNIZED BY EPA'S INTEGRATED RISK INFORMATION SYSTEM. EPA lists its approved Cancer Slope Factors for chemicals on its integrated risk information system (IRIS). The Slope Factor for TCE was removed in 1989 and EPA is developing a revised toxicological profile and Slope Factor for this chemical. The revised toxicological profile has been released for public review and it contains an EPA toxicologist's derived Slope Factor for TCE (EPA 2001). This profile has been reviewed by EPA's Science Advisory Board (EPA 2002) and sent back for revisions due to problems with the underlying science used in its development. Other groups have criticized the underlying science behind the Cancer Slope Factor derivation and EPA Region 8 has rejected it, preferring to use an alternative. This draft toxicological profile should not be used to calculate risk at the Site until the problems and questions have been addressed and the Slope Factor is published on IRIS.*

EPA Response PRP-4: U.S. EPA's Superfund Health Risk Technical Support Center issued a memo recommending that risks from TCE exposure be evaluated using the updated toxicity values in Trichloroethylene Health Risk Assessment: Synthesis and Characterization (EPA/600/P-01/002A) August 2001 External Review Draft. The Superfund Health Risk Technical Support Center memo was issued on July 15, 2003 and a copy is in the Administrative Record for the site. These are the toxicity values EPA used to recalculate the TCE risks at the site.

Comment PRP-5: *THE RECALCULATED RISK ASSESSMENT USES A CANCER SLOPE FACTOR FOR PCE THAT IS NOT ACCEPTED BY EPA OR RECOGNIZED BY EPA'S INTEGRATED RISK INFORMATION SYSTEM (IRIS). EPA has no current determination of the carcinogenicity of PCE (IRIS 2003) but is in the process of developing a revised toxicological profile and Slope Factor for this chemical. The draft toxicological profile will reportedly not be issued for public review until later this year. In the absence of a final approved Slope Factor, the value recommended by the EPA National Center for Exposure Assessment should be used. To that end NCEA provided a value lower than that used by EPA's contractor. The higher draft unsubstantiated value should not have been used for quantitatively estimating Site risks.*

EPA Response PRP-5: OSWER Directive No. 9285.7-75 (June 12, 2003) supports the use of an inhalation unit risk of 5.9E-6 $(ug/m3)^{-1}$ and an oral slope factor of 5.4E-1

(mg/kg-day)$^{-1}$ for PCE. These are the toxicity values EPA used to recalculate the PCE risks at the site. A copy of this directive is in the Administrative Record for the site.

Comment PRP-6: *THE REVISED RISK ASSESSMENT OMITS THE CHILD EXPOSURE PATHWAY AND SO IS INCOMPLETE. The recalculated risks provided as, "Recalculated cancer risk for adult exposure to groundwater using reasonable maximum exposure assumptions in 2001 risk assessment with revised toxicity values for TCE and PCE and 2002 groundwater data," provides a risk estimate for an adult exposure scenario, ignoring the installed Site remedy and assuming, incorrectly, that groundwater is used in a house, and cites the 2001 RI. However, Section 9 of the RI calculates risks for both an adult and a child. The recalculation fails to include this pathway, but should if it is to be consistent with the first risk assessment. Including a child scenario will lead to higher estimated risks and is consistent with the prior risk assessment. However, this method of calculation is no longer appropriate because there is no longer exposure via this pathway. EPA guidance (EPA 2001b, EPA Region 8 2000) does not recommend the use of a child/adult exposure scenario for inhalation, but the use of an adult exposure scenario only. This is consistent with the EPA's Vapor Intrusion Guidance (EPA 2001b) generally used by EPA's contractor in their Indoor Air Risk Assessment (Weston, 2003), but not for this aspect; thereby resulting in a higher estimated risk. The methodology used by Region 8 and in the VIG is the methodology that should have been used in the risk recalculation. Changing the exposure duration from 24 to 30 years, and not including the child portion of the calculation can correct this.*

EPA Response PRP-6: See EPA Response PRP-1. The groundwater risks were recalculated using the exposure assumptions in the EPA-approved 2001 Risk Assessment for the site. In the 2001 Risk Assessment, the cancer risks for TCE and PCE were higher for an adult exposure than for a child exposure. (However, non-cancer risks were higher for children than adults.) Because EPA was recalculating cancer risks and not non-cancer risks, it was only necessary for EPA to recalculate the risks based on an adult exposure. Use of a 30 year adult exposure scenario is consistent with RAGS (Section 6) and "Human Health Evaluation Manual Supplemental Guidance: "Standard Default Exposure Factors" (OSWER Directive 9285.6-03). Use of more conservative exposure factors may be appropriate for future risk evaluations.

Comment PRP-7: *EPA'S CONTRACTOR FAILED TO SHOW THAT INDOOR AIR CHEMICALS ARE RELATED TO GROUNDWATER. In its data evaluation of the Indoor Air risk assessment, EPA's contractor did not evaluate groundwater as a potential source of soil vapor and indoor air chemicals. The best example of this is for the gasoline chemicals (e.g., benzene, ethyl benzene, etc.). Benzene has never been found in groundwater at the Site and should have been eliminated from any indoor air analysis. It is found in gallon quantities in almost every automobile in America and is present in many homes, especially those with attached garages, at high levels. Nevertheless, the report states that benzene is Site related (ASR,Table 7-4) and uses elevated risk level to justify additional field studies and research. The levels of chemicals in soil vapor do not justify additional soil vapor investigations. These soil vapor levels are highly variable and sporadic, around the houses sampled. This variability indicates potential small local sources such as small spills by home owners (while filling a lawn mower, painting, etc.), cleaning fluids from septic tanks and other small sources. These types of chemicals are unrelated to the groundwater issues investigated as part of the RI for the Site as a whole. EPA's contractor is recommending that all of these small sources be characterized, but this characterization is unrelated to*

and not the responsibility of the groundwater RI/FS. Its outcome should have no bearing in the remediation of groundwater.

EPA Response PRP-7: EPA evaluated groundwater concentrations as a potential source of vapor contamination in Section 5.4 of the Air Sampling Report. However, as discussed in Section 8.4 of the Air Sampling Report, shallow groundwater at and near the water table in the residential area has not been characterized and there are many uncertainties and data gaps concerning the vapor intrusion pathway. These will be addressed as part of EPA's selected remedy and will be used to determine where additional vapor monitoring is necessary.

Benzene was found at low levels in groundwater at 2 locations upgradient of the residential area. Benzene was also found in soil samples collected from the former AAA Disposal property as high as 1,000 ug/kg (see 104e Response Attachments for Waste Management of Michigan in the Administrative Record). Because benzene has been found in groundwater and soil samples outside the residential area, and because of the uncertainties associated with the groundwater characterization (see EPA Response PRP-2), EPA cannot rule out the possibility that benzene may be site-related.

Comment PRP-8: *THE INDOOR AIR RISK ASSESSMENT CALCULATES THE RISK FROM BACKGROUND INDOOR AIR AND NOT SITE-RELATED CHEMICALS. All homes contain "household products" that contain chemicals, or there are residual chemicals present from home construction, house paints, furniture and hobbies, and gasoline from cars, lawn mowers and snow blowers (background chemicals). These products all add risk to the air in a home, but they are essentially ubiquitous in a domestic environment. The Air Sampling study measured these background indoor air chemicals. However, EPA's contractor incorrectly assumed that most of these chemicals were present due to vapors from groundwater and not household products. The Site indoor air chemical data has been used to justify an indoor air research project to further characterize indoor air regardless of its lack of connection to groundwater. There are numerous papers, including those in the VIG, that show ranges of indoor air chemicals. The data collected by EPA's contractor are all within the ranges of these prior studies.*

EPA Response PRP-8: EPA attempted to determine whether chemicals were more likely to be household related or site-related by comparing contaminant concentrations in soil gas to contaminant concentrations in the basement and first floor of each home, and considering other factors about the home (see Section 2.7.1 and Tables 7-a to 7-d in the ROD). At the homes where the majority of these chemicals appeared to be household related, EPA did not include these chemicals in the indoor air risk calculations for those homes. Because these chemicals were detected in groundwater at the site, EPA still included them in the soil gas risk calculations.

At other homes, it appeared as if some of the PCE, benzene and ethyl benzene found in the homes was household-related and some of these chemicals were site-related. At those homes, EPA included these chemicals in the risk calculations. However, at one home (Home B) where some of the benzene and ethyl benzene (as well as toluene and xylene) in the home appeared to be coming from the first floor garage and some appeared to be coming up through the soil gas, EPA based the risk calculations for that home on the basement concentrations of those chemicals.

Comment PRP-9: *THE GROUNDWATER RISK ASSESSMENT USED TO JUSTIFY ADDITIONAL INVESTIGATION AT THE SITE HAS NO RELATIONSHIP TO THE INVESTIGATION BEING PROPOSED. The risk assessment used to justify additional investigation at the Site is the incorrect recalculation of risks using the methodology provided in Weston 2001. This assessment ignores the completed remedy and falsely assumes groundwater is piped into the house and releases hazardous vapors via showering. EPA's contractor has proposed over $8 million of additional investigation to collect data related to a hypothetical vapor migration and indoor air risk. In 2001, EPA's contractor concluded that "soil and sediment sampling is not warranted and no new monitoring wells are recommended at this time" (Remedial Investigation, Section 11, p. 7). In 2002, supplemental Site groundwater data was collected, indicating lower Site-wide concentrations then observed during previous monitoring events. In spite of the obvious temporal trends of declining PCE and TCE concentrations, additional investigation activities estimated to cost over $8 million were recommended in 2003 (Proposed Plan). Even when contaminant concentrations were higher, EPA's own contractor concluded that no "soil and sediment sampling... and no new monitoring wells are recommended" (Remedial Investigation, Section 11, p. 7).*

EPA Response PRP-9: See EPA Response PRP-1 and PRP-2. The RI/FS is not complete until EPA issues a ROD for the site. The Evergreen Manor ROD is based on the RI as well as the more recent sampling and analysis presented in the Groundwater Data Evaluation Report and the Air Sampling Report, as well as other information in the Administrative Record.

As indicated in EPA's Proposed Plan (p. 3) and the ROD (Section 2.11.1, 2.11.2 and Appendix G), the actual cost of EPA's selected remedy may be significantly less than $8.5 million and will depend on the results of the predesign investigations as well as the results of the long-term monitoring.

Also, the maximum detected concentration of TCE was higher in 2002 than it was in 2000 (7.2 ug/l in 2002 compared to 6 ug/l in 2000).

Comment PRP-10: *EPA'S CONTRACTOR IS IMPOSING UNREALISTIC STANDARDS AT EVERGREEN MANOR COMPARED TO OTHER EPA REGION 5 SITES. Issues similar to those at Evergreen Manor have been identified at Warner Electric's Facility, Roscoe, Illinois and EPA Region 5 recently approved a work plan to investigate the potential for indoor air impacts due to volatile organic chemicals in groundwater through vapor migration pathways. This work plan, prepared by MacTec, recognizes that background indoor air chemicals are present in indoor air due to normal residential activities and reports a range for background 1,1,1-TCE and TCE provided by EPA's Vapor Intrusion Guidance (EPA, 2002). A similar approach should have been used at Evergreen Manor. Using the same citation, background in indoor air concentrations for the potential groundwater chemical PCE would be 21.1 µg/m3. This exceeds any level of PCE found in indoor air at the Evergreen Manor Site. EPA Region 5 has already approved the use of indoor air background at similar Sites. At the same Site, EPA has approved a screening level of 1 µg/m3 for screening level TCE in indoor air. The level used by EPA's contractor for TCE at the Evergreen Manor Site was 0.017 µg/m3. This level is about 60 times more conservative than that approved by EPA as a screening level at the Warner Electric Facility. The Warner Electric Facility Work Plan uses a mid-point Slope Factor of 8.5 E-2 (mg/kg/day)-1 from the range of Slope Factors provided by EPA for evaluating TCE via inhalation. If this mid-point Slope Factor were*

used by EPA's contractor at the Evergreen Manor Site, the risk calculated would be 6 fold lower and demonstrate there is no unacceptable risk at the Evergreen Manor Site.

EPA Response PRP-10: See EPA Responses PRP-4, PRP-5 and PRP-8. EPA evaluated the Evergreen Manor site consistent with the NCP and Superfund guidance. The Warner Electric Facility is a RCRA site. EPA's Vapor Intrusion Guidance does not indicate that indoor air concentrations should be screened against specific numerical "background" levels. According to the guidance (Appendix I), all information on background indoor air concentrations should be considered along with all of the information collected about the site and the nature of the contamination when conducting site-specific risks assessments and determining appropriate risk management actions. The guidance goes on to further discuss "Role of Background in the CERCLA Cleanup Program" (OSWER Directive 9285.6-07P, 2002) which indicates that Superfund risk assessments should not eliminate contaminant concentrations attributable to background sources from further consideration, and encourages a baseline risk assessment approach that retains constituents that exceed risk-based screening concentrations and encourages addressing site-specific background issues at the end of the risk assessment phase. According to the Vapor Intrusion Guidance:

> *Although VOCs and indoor air concerns are not explicit in the CERCLA "Role of Background..." it seems to suggest that VOCs with both subsurface site release-related and background related sources should be included in any site risk assessment. Consistent with the CERCLA "Role of Background..." it is recommended that any significant background concentrations of VOCs be discussed in the risk characterization in a comprehensive manner along with any available data distinguishing the background contribution from site release-related VOC concentrations.*

As discussed in EPA Response PRP-8, EPA's risk assessment of vapor intrusion at the Evergreen Manor site was consistent with this approach.

Comment PRP-11: *Comments PRP-12 to PRP-24 pertain to the "EPA Proposes Cleanup Plan for Ground-Water Contamination, Evergreen Manor Site, Roscoe, Illinois," EPA, Region 5, Chicago, Illinois, July 2003. The comments with regard to the proposed plan show:*

- *Natural attenuation is an appropriate remedy;*
- *The evaluation of alternatives is heavily biased towards further investigation by EPA's contractor;*
- *Site risks are mischaracterized, unrealistic, and exaggerated*
- *The selected alternative contains investigative tasks that are inappropriate in both scope and purpose.*

EPA Response PRP-11: This comment is a summary of Comments PRP-12 to PRP-24. See EPA Responses PRP-12 to PRP-24.

Comment PRP-12: *Due to the response actions previously completed at the Site and the declining concentrations of contaminants in groundwater, the EPA's proposal to use "natural attenuation to clean up the remaining ground-water contamination" (Proposed Plan, p. 1) at the Site is an appropriate remedy and fully protective of human health and the environment.*

EPA Response PRP-12: EPA agrees that with local groundwater use controls, appropriate monitoring programs and contingency plans, natural attenuation is an appropriate remedy for the site and is fully protective of human health and the environment.

Comment PRP-13: *One of the "Main Findings" of the proposed plan is that "EPA would like to continue ground-water and vapor monitoring" (Proposed Plan, p. 1). This is not an appropriate rationale for the proposed 8.5 million dollar expenditure.*

EPA Response PRP-13: The Proposed Plan is a fact sheet, not a technical document. Page 1 of the Proposed Plan states:

> *This fact sheet is a summary of information contained in the RI/FS for the Evergreen Manor site. Please consult that document, which can be found at the Roscoe Branch Library, for more detailed information.*

Comment PRP-14: *The notion that "[g]round-water vapors were found in some homes, but not at levels that are hazardous" (Proposed Plan, p. 1) is contradicted by the data presented in the GDER, which indicates that there was no correlation between indoor air concentrations and groundwater concentrations. Rather it is apparent that the levels found are consistent with domestic background sources.*

EPA Response PRP-14: See EPA Responses PRP-7, PRP-8 and PRP-13.

Comment PRP-15: *The statement "EPA found that some chemicals from the Site may be getting into area homes" (Proposed Plan, p. 2) is contradicted by the data presented in the GDER, which indicates that there was no correlation between indoor air concentrations and groundwater concentrations.*

EPA Response PRP-15: See EPA Responses PRP-7, PRP-8 and PRP-13.

Comment PRP-16: *The Proposed Plan acknowledges that "residents are connected to the North Park water supply and are not drinking contaminated groundwater" (Proposed Plan, p. 2). Despite this, the Proposed Plan describes risks to people and the environment as including the "risks from using the ground water for drinking and showering, and from potentially breathing Site-related chemicals found in the indoor air" (Proposed Plan, p. 2).*

EPA Response PRP-16: See EPA Responses PRP-1 and PRP-13.

Comment PRP-17: *The No Action (Alternative 1) remedy "does not include... local government controls to limit or restrict new wells from being installed in contaminated areas" (Proposed Plan, p. 4). The No Action alternative ignores the fact that response actions have already been completed at the Site.*

EPA Response PRP-17: The No Action alternative does not include local government controls to restrict new wells from being installed in contaminated areas because these controls do not currently apply to all areas of the site. Similarly, EPA's response actions did not provide municipal water to all areas of the site. See Comments and EPA Responses LG-3 and LG-4 for an explanation of how EPA expects the local government controls to work at the site. Also, even if local government controls and

response actions did apply to all areas of the site, under the No-Action alternative, these controls would not be required or monitored by EPA.

While Winnebago County Code Article III Section 86-111 requires properties within 200 feet of a public water supply to connect to the water supply instead of drilling a well, not all areas of the site are serviced by municipal water (ROD Figure 8). In areas where municipal water is not available and where it is uncertain whether groundwater contaminants are still above drinking water levels (e.g., the 1-mile tract of farmland north of the residential areas), EPA and Winnebago County will work together to discourage (but without the authority to prevent) groundwater use, and will sample new wells and, if necessary, implement contingency actions to ensure that residents are not exposed to unacceptable levels of contaminants. These activities are "active" response actions and can not be considered under the No Action alternative.

Comment PRP-18: *The evaluation of alternatives culminating in the proposed plan is replete with problems in analysis, for example, due to the response actions already taken (connection to municipal water and an ordinance prohibiting groundwater use), Alternative 1 (No Action) and Alternative 3 (MNA) are essentially the same remedy except that Alternative 3 includes groundwater and vapor monitoring. Yet MNA "meets criteria" and No Action does "does not meet criteria" for a variety of comparisons that do not depend upon monitoring, including: 1) Long term effectiveness and permanence, 2) Reduction of toxicity, mobility or volume through treatment and 3) Short-term effectiveness.*

EPA Response PRP-18: See EPA Responses PRP-13 and PRP-17. EPA will also request the Winnebago County Regional Planning and Economic Development Department to notify EPA when the department issues a permit for new construction in the area so that EPA can determine whether vapor intrusion may be an issue in that area and whether additional vapor-related evaluation is warranted. A complete discussion of why the No Action alternative does not meet these criteria is provided in Section 4.2.1.2 of the FS and Section 2.10 of the ROD.

Comment PRP-19: *The overall protection of human health and the environment criteria "[e]valuates whether a cleanup option provides adequate protection and evaluates how risks are eliminated, reduced or controlled through treatment, engineering controls or local government controls" (Proposed Plan, p. 7). A determination was proposed that the No Action (Alternative 1) does not meet this criteria. The rejection of this criteria ignores the response actions that have already been completed at the Site, including the connection of residents to municipal water and the enactment of an ordinance to prohibit groundwater use. The response actions taken to date constitute "engineering controls" and "government controls." The Remedial Investigation describes how "risks are eliminated, reduced or controlled," stating, "The result of this removal action is that it has effectively deleted the residential well exposure route pathway that was discussed in the human health risk assessment. Thus, since the exposure pathway has been eliminated, the associated human health risk has also been eliminated." (2001 RI, Section 11, p. 6).*

EPA Response PRP-19: See EPA Responses PRP-1, PRP-9, PRP-13, PRP-17 and PRP-18.

Comment PRP-20: *Long-term effectiveness and permanence "[c]onsiders any remaining risks after a cleanup is complete and the ability of a cleanup option to*

maintain reliable protection of human health and the environment once cleanup goals are met" (Proposed Plan, p. 7). A determination was proposed that the No Action (Alternative 1) remedy did not meet this criteria. The rejection of this criteria ignores the fact that contaminant concentrations are decreasing over time and are expected to fall below MCLs in a few years. Natural attenuation is a permanent process that destroys the chemicals and, unlike pump and treat, is not subject to rebound after the system is turned off. It also ignores the fact that residents were permanently connected to the municipal water supply, and the fact that a local ordinance was enacted to permanently prohibit groundwater use at the Site.

EPA Response PRP-20: See EPA Responses PRP-13, PRP-17 and PRP-18.

Comment PRP-21: *Short-term effectiveness "[c]onsiders the time needed to clean up a Site and the risks a cleanup operation may pose to workers, the community and the environment until cleanup goals are met" (Proposed Plan, p. 7). A determination was proposed that the No Action (Alternative 1) remedy did not meet this criteria. The rejection of this criteria is not supported when considering that 1) the estimated cleanup time for No Action and MNA (Alternative 3) are identical, 2) No Action poses less risk to workers, and 3) No Action and MNA both rely on completed response actions including municipal water supply and groundwater use prohibitions.*

EPA Response PRP-21: See EPA Responses PRP-13, PRP-17 and PRP-18.

Comment PRP-22: *Reduction of toxicity, mobility, or volume through treatment "[e]valuates a cleanup option's use of treatment to reduce the harmful effects of the contaminants, their ability to move in the environment and the amount of contamination present" (Proposed Plan, p. 7). A determination was proposed that the No Action (Alternative 1) did not meet this criteria. The rejection of this criteria is not supported considering that No Action and MNA (Alternative 3) remedies both rely exclusively on natural attenuation for the reduction of toxicity, mobility, or volume.*

EPA Response PRP-22: See EPA Responses PRP-13 and PRP-18.

Comment PRP-23: *Implementability is "the technical and administrative feasibility of implementing a cleanup option and includes factors such as the relative availability of goods and services" (Proposed Plan, p. 7). With no explanation, the No Action remedy is categorized as "does not meet criteria" for implementability. This is simply incorrect. The proposed determination suggests an unwillingness on the part of EPA or its contractor to consider the No Action remedy except as a formality.*

EPA Response PRP-23: This was an error in the Proposed Plan. EPA agrees that the No Action alternative is readily implementable. See Section 4.2.1.2 of the FS and Section 2.10.6 of the ROD.

Comment PRP-24: *Since concentrations detected in groundwater are very low and decreasing, the No Action alternative was not properly evaluated.*

EPA Response PRP-24: See EPA Responses PRP-13 and PRP-18. See also Section 2.9.1 of the ROD.

Comment PRP-25: *Comments PRP-26 to PRP-41 pertain to the Feasibility Study, Evergreen Manor Site, Roscoe, Illinois, Weston Solutions, Inc., July 2003. The*

comments with regard to the feasibility study show that the evaluation of alternatives is based on:

- *Overstated risk assumptions that are not warranted;*
- *Assumes indoor air is a problem when the data suggests that it is not;*
- *Proposes additional investigation with a scope that is clearly beyond that which is reasonable or necessary.*

EPA Response PRP-25: This comment is a summary of Comments PRP-26 to PRP-41. See EPA Responses PRP-26 to PRP-41.

Comment PRP-26: *The risk assessment used to justify additional investigation at the Site is the incorrect recalculation of risks using the methodology provided in Weston 2001. This assessment ignores the completed remedy and falsely assumes groundwater is piped into the house and releases hazardous vapors via showering. EPA's contractor has proposed over $8 million of additional investigation to collect data related to vapor migration and indoor air. Yet, these investigations will not address any hypothetical risks from groundwater being piped into a house as envisaged by the recalculated risk estimate.*

EPA Response PRP-26: See EPA Response PRP-1. Additional details concerning why the additional vapor investigations are needed are provided in Section 8 of the Air Sampling Report and Sections 2.7.1 and 2.7.3 of the ROD.

VOC-contaminated groundwater is flowing beneath approximately 300 homes and EPA found TCE, PCE and other potentially site-related contaminants in soil gas. EPA also found PCE and other potentially site-related contaminants in indoor air samples. Although none of the contaminants were detected above a risk level of 1 x 10-4, EPA's vapor intrusion investigation was a one-time sampling event at only 4 of almost 300 homes in the area. Property and residence-specific factors can influence indoor air concentrations and there is some uncertainty as to whether the 4 residences EPA sampled provide a reasonable characterization of vapor intrusion in all the homes in the area. Indoor air concentrations can also be affected by seasonal variations and EPA's one-time sampling event may not provide an accurate assessment of longer-term average indoor levels. Also, because shallow groundwater at and near the water table in the residential area has not been characterized, EPA is also uncertain whether the 4 homes that EPA sampled were located over the highest remaining areas of groundwater contamination, or whether other homes could be at a greater risk. As indicated in Sections 2.9.3, 2.11.1 and 2.11.3 of the ROD, the additional vapor investigations and monitoring as needed will ensure that potential risks from site-related soil vapors remain below acceptable levels .

The estimated costs for collecting data related to vapor intrusion and indoor air is not over $8 million. As indicated in Appendix F of the FS and Table 15 and Appendix I of the ROD, the estimated costs for collecting vapor intrusion-related data are approximately $331,587 in direct costs and up to $6.42 million total for 7 years of long-term monitoring. However, as indicated in Section 4.2.3 of the FS and Sections 2.9.3 and 2.11 of the ROD, the costs for vapor-related activities may be significantly less and will depend on the results of the pre-design investigations as well as the results of the long-term vapor monitoring. See also Section 7.2.2 in Appendix G of the ROD and EPA Response CI-13.

Comment PRP-27: *In 2001, EPA's contractor concluded that "soil and sediment sampling is not warranted and no new monitoring wells are recommended at this time" (Remedial Investigation, Section 11, p. 7). In 2002, supplemental Site groundwater data was collected, indicating lower Site wide concentrations than observed during previous monitoring events. In spite of the obvious temporal trends of declining PCE and TCE concentrations, additional investigation activities estimated to cost over $8 million were recommended in 2003 (Proposed Plan). Even when contaminant concentrations were higher, EPA's own contractor concluded that no "soil and sediment sampling... and no new monitoring wells are recommended" (Remedial Investigation, Section 11, p. 7).*

EPA Response PRP-27: See EPA Response PRP-9.

Comment PRP-28: *Soil vapor and indoor air monitoring proposed by EPA's contractor is not justified because the Air Report prepared by Weston showed risks to residents from their indoor air was within the acceptable risk range.*

EPA Response PRP-28: See EPA Response PRP-26.

Comment PRP-29: *EPA's contractor is proposing a research that consists of collecting hundreds of samples to evaluate soil gas and shallow groundwater. There is no risk-based justification for this investigation. Groundwater has been shown to have groundwater concentrations that are below the MCL on average and maximum concentrations that are almost at the MCL. Indoor air samples have been shown to have risks that are within the EPA's acceptable risk range, especially when only indoor air chemicals also found in groundwater are considered.*

EPA Response PRP-29: See EPA Response PRP-26. The location of the center of the contaminated groundwater plume, horizontally and vertically, is unclear, and chemical concentrations in the groundwater could actually be higher than detected. Almost all of the existing groundwater monitoring wells scattered across the 2-mile site (27 wells at 17 locations) were installed at predetermined depths and locations without the use of temporary well point transects or vertical profiling, and groundwater monitoring wells and vertical profiling locations do not correspond well with areas where contaminants were historically located (ROD Figure 2). Because only generally low levels of contaminants have been detected in the monitoring wells, it is not certain if groundwater concentrations have decreased to the extent indicated, or if the wells are located to accurately portray the plume (see ROD Appendix G). Shallow groundwater at and near the water table in the residential area has not been characterized.

The additional groundwater, residential well and vapor investigations conducted during predesign activities will be used to determine where additional long-term monitoring is necessary to verify that the cleanup is progressing and that residents are not exposed to unacceptable levels of groundwater or vapor contaminants during the cleanup. The predesign investigations will ensure that the long-term monitoring is conducted in the appropriate locations and will generate greater confidence in the results and conclusions indicated by the data.

Comment PRP-30: *Based on the current groundwater monitoring data, EPA's contractor has no basis for conducting further soil vapor and indoor air investigations associated with the Evergreen Manor Site. This research project is based on a misunderstanding of the nature of vapor intrusion from a groundwater source. For example, page 37, states that, "Soil sampling may be needed at locations where*

groundwater sample results do not correlate well with soil gas results to determine whether there are any homeowner spills." If there is no groundwater problem, there can be no groundwater-derived indoor air problem. Researching homeowner chemical spills is not and should not be the objective of additional Site-related work.

EPA Response PRP-30: See EPA Responses PRP-26 and PRP-29. Groundwater samples may not correlate well with soil gas results due to preferential pathways. For example, higher-permeability features (e.g., utility conduits) and ground cover (e.g., vegetation vs. paved surfaces) may induce vapor channeling along specific routes (see 8.4 in Air Sampling Report). Prior to the municipal water hook up in 1999-2000, household water discharged to septic systems was obtained from residential wells that drew water from the contaminated Evergreen Manor plume, and these septic systems may also be acting as a "secondary" site-related source of soil vapors.

The purpose of the soil sampling is not to research homeowner chemical spills, but, where needed, to be able to confirm that a soil gas problem is not site-related and does not require additional Superfund investigation, monitoring or remediation.

Comment PRP-31: *EPA's contractor is proposing to collect hundreds of indoor air samples over at least two years. This study is unnecessary and poorly conceived, based on their approach in the "Indoor Air Report" (Weston, 2002), the study will continue to research what is apparently a background indoor air quality issue. That is, monitor vapors within the home generated by the owner. The study design will generate indoor air data that is unrelated to groundwater. For example, monitoring air near a garage to show the presence of BTEX-related chemicals would never allow the elimination of BTEX as a groundwater source, if the contractor does not believe its absence in groundwater is not already adequate to show this.*

EPA Response PRP-31: See EPA Responses PRP-26, PRP-29 and PRP-30. As indicated in Sections 2.9.3 and 2.11.1 of the ROD, the details of the final vapor monitoring program will be developed during the remedial design phase based on the results of pre-design investigations conducted to address the uncertainties identified in the 2003 Air Sampling Report. EPA is willing to consider a phased monitoring approach in which indoor air samples are only collected at homes where soil vapor results indicate a potential risk to indoor air.

Comment PRP-32: *The collection of soil data to determine the nature of homeowner releases and to continue monitoring these homeowner releases, "until it is confirmed that soil vapor intrusion via soil gas is not a threat" is not relevant to Evergreen Manor groundwater.*

EPA Response PRP-32: The purpose of the soil sampling is not to research homeowner chemical spills, but, where needed, to be able to confirm that a soil gas problem is not site-related and does not require additional Superfund investigation, monitoring or remediation.

Comment PRP-33: *All response action alternatives except No Action incorporate "Institutional controls for air (vapor intrusion)" (FS Section 3, p. 1). It has been shown that there is no correlation between contaminants in groundwater and indoor air and these institutional controls are unnecessary. Additionally, the overall trend towards decreasing VOC concentrations is clear and unequivocal.*

EPA Response PRP-33: See EPA Responses PRP-26 and PRP-29.

Comment PRP-34: *Groundwater monitoring and vapor monitoring are not institutional controls. Institutional controls are "a legal mechanism for imposing a restriction on land use" (35 IAC 742.200). The relevant institutional controls are already in place, namely the local ordinance prohibiting groundwater use at the Site.*

EPA Response PRP-34: While groundwater monitoring and vapor monitoring may or may not be institutional controls as defined in 35 IAC 742.200, the results of the groundwater and vapor investigations and monitoring are needed for EPA and Winnebago County to be able to effectively implement Winnebago County ordinances that, along with contingency actions, will ensure that future residents are not exposed to unacceptable levels of groundwater and soil vapor contaminants. See Comments and EPA Responses LG-3 and LG-4 for an explanation of how EPA expects the local government controls to work at the site.

While Winnebago County Code Article III Section 86-111 requires properties within 200 feet of a public water supply to connect to the water supply instead of drilling a well, not all areas of the site are serviced by municipal water (ROD Figure 8). In areas where municipal water is not available and where it is uncertain whether groundwater contaminants are still above drinking water levels (e.g., the 1-mile tract of farmland north of the residential areas), EPA and Winnebago County will work together to discourage (but without the authority to prevent) groundwater use, and will sample new wells and, if necessary, implement contingency actions to ensure that residents are not exposed to unacceptable levels of contaminants.

Additionally, EPA will request the Winnebago County Regional Planning & Economic Development Department to notify EPA when the department issues a permit for new construction in the area so that EPA can determine whether vapor intrusion may be an issue in that area and whether additional vapor-related evaluation is warranted.

Comment PRP-35: *There is a logical disconnect between the reason for rejecting the No Action alternative ("no reduction of present and future risk") and the admission in the very next sentence that "the Site does not pose an imminent threat to human health and the environment." Since there are no imminent risks, a reduction in risk is unnecessary. Additionally, concentrations are declining and therefore any associated risk is being further reduced over time. A Site with no risk requires no remedial action.*

EPA Response PRP-35: See EPA Responses PRP-1 and PRP-26 concerning the risks at the site. Following the language cited above, the next sentence in the FS states that: "Current site risks are manageable without action if additional time is required to select or evaluate alternatives...." Also, this discussion is presented in Section 3 of the FS, "Preliminary Screening of Alternatives." A full discussion of the No Action alternative can be found in Section 4.2.1 of the FS and Sections 2.9.1 and 2.10 of the ROD.

Comment PRP-36: *EPA's contractor claims that the No Action alternative "would not be effective in...reducing the toxicity, mobility, or volume of the chemicals of concern (COCs) within the various environmental media at the Site" (FS Section 3, p. 7). This is a disingenuous claim because EPA's contractor has already admitted that there is "an overall decreasing trend in chlorinated VOC concentrations over time" (Section 6, p. 3).*

EPA Response PRP-36: Section 3 of the FS is a "Preliminary Screening of Alternatives." Please see Section 4.2.1 of the FS and Sections 2.9.1 and 2.10 of the ROD for a full discussion of the No Action alternative.

Comment PRP-37: *EPA's contractor claims that the No Action alternative "would not be effective in...reducing the toxicity, mobility, or volume of the COCs within the various environmental media at the Site" (FS Section 3, p. 7). This is directly contradicted by a comparison of the estimated time to achieve remedial objectives for Alternative 1 (15 years) and Alternative 3 (15 years).*

EPA Response PRP-37: See EPA Response PRP-36.

Comment PRP-38: *EPA's contractor claims that the No Action alternative does not offer long term effectiveness and permanence because no remedial action is implemented." (FS Section 3, p. 8). This claim is incorrect because it ignores the corrective action that has already been completed. This alternative does offer long term effectiveness and permanence because all residences have been permanently connected to Municipal water and there is a local ordinance in place that prohibits the use of groundwater for domestic purposes. Furthermore, the contaminant concentrations in groundwater have been steadily declining and are expected to drop below drinking water standards in a few years.*

EPA Response PRP-38: See EPA Responses PRP-17, PRP-34 and PRP-36.

Comment PRP-39: *The MNA alternative is unnecessarily encumbered with an investigation and monitoring program (described in the groundwater report) which is unnecessary and unsupported by the facts apparent in EPA's own Administrative Record.*

EPA Response PRP-39: See EPA Responses PRP-1, PRP-26, PRP-29 and PRP-34.

Comment PRP-40: *EPA's contractor also claims that "[d]etailed contaminant fate and transport modeling would be needed to monitor the effectiveness of natural attenuation." There is no indication that costly modeling is necessary. In fact, the existing data is already sufficient for an evaluation of natural attenuation.*

EPA Response PRP-40: This comment appears to be referring to a statement in Section 3 of the FS, which is in the section entitled "Preliminary Screening of Alternatives." Please see Section 4.2.3 of the FS and Sections 2.9.3 and 2.11 of the ROD for a full discussion of the Monitored Natural Attenuation alternative. EPA does not anticipate detailed fate and transport modeling at this time. However, it is included as a contingency action (see Section 2.11.1 of ROD).

Comment PRP-41: *EPA's contractor failed to evaluate the most suitable remedial alternative for this Site, namely monitored natural attenuation with "reasonable" monitoring. Specifically, as for other "MNA" Sites, the Evergreen Manor Site should have limited annual monitoring at a select number of wells to confirm the continuing efficacy of the remedy and document declining temporal concentration trends. Indeed, this alternative, was neither identified nor discussed by the Feasibility Study report.*

EPA Response PRP-41: Monitored natural attenuation remedies are site-specific cleanup plans designed to meet the remedial action objectives and data requirements

for each site. The additional groundwater, residential well and vapor investigations conducted during predesign activities will be used to determine where additional long-term monitoring is necessary to ensure that the cleanup is progressing and that residents are not exposed to unacceptable levels of groundwater or vapor contaminants during the cleanup. See EPA Responses PRP-1, PRP-26, PRP-29 and PRP-34 for additional explanations as to why this monitoring is needed. As indicated in Section 4.2.3 of the FS, Sections 2.9.3 and 2.11 of the ROD and Section 7.2 in Appendix G of the ROD, the extent of the additional sampling and monitoring will be determined during the remedial design and will depend on the results of the pre-design investigations as well as the results of the long-term monitoring programs. The predesign investigations will ensure that the long-term monitoring is conducted in the appropriate locations and will generate greater confidence in the results and conclusions indicated by the data.

Comment PRP-42: *Comments PRP-43 to PRP-57 pertain to Section 9, Human Health Risk Assessment of the Remedial Investigation Report, Evergreen Manor Site, Roscoe, Illinois, Roy F. Weston, Inc., March 2001. The comments with regard to the remedial investigation show:*

- *Identification of chemicals of potential concern was performed incorrectly and generally not in accordance with EPA guidance;*
- *The exposure assessment incorrectly assumes exposure pathways where none exist.*
- *Risk characterization is incorrect.*

EPA Response PRP-42: This comment is a summary of Comments PRP-43 to PRP-57. See EPA Responses PRP-43 to PRP-57.

Comment PRP-43: *As stated by EPA's contractor (page 6), the Chemicals of Potential Concern (COPC) in Table 2.1 of Appendix A were screened against toxicity values with a cancer risk based concentration set at 0.1 in a million or an hazard index set at 0.1. This is an inappropriate screen. The EPA Region 3 guidance cited uses a risk level 1 in a million for screening.*

EPA Response PRP-43: The Evergreen Manor site is an EPA Region 5 site. The screening levels used in the Evergreen Manor risk assessment are appropriate because they are conservative (even more conservative than the EPA Region 3 screening levels) and are less likely to result in an underestimation of risk. RAGS (Section 5.9) does not indicate that chemicals must be screened out in a risk assessment, only that screening may be appropriately conducted at sites where there is a large number of chemicals to be carried through the quantitative risk assessment.

Comment PRP-44: *The MCLs should have been used for screening groundwater. When the groundwater remedy was implemented at the Site, exposure to residents through drinking water was eliminated and an appropriate and conservative screen for groundwater becomes the MCL. If this had been done: acetone, methylene chloride and benzene would have been screened out of the analysis.*

EPA Response PRP-44: The screening levels used in the Evergreen Manor risk assessment are appropriate because they are even more conservative than MCLs and are less likely to result in an underestimation of risk. RAGS (Section 5.9) does not indicate that chemicals must be screened out in a risk assessment, only that screening

may be appropriately conducted at sites where there is a large number of chemicals to be carried through the quantitative risk assessment.

Comment PRP-45: *EPA's contractor did not screen based on detection frequency as recommended by EPA guidance. In accordance with EPA Region 8 guidance and Risk Assessment Guidance for Superfund (EPA 1994, and EPA 1998, respectively) for the selection of Compounds of Concern (COC) a 5 percent detection frequency screen should have been used.*

EPA Response PRP-45: RAGS (Section 5.9) does not indicate that chemicals must be screened out in a risk assessment, only that screening may be appropriately conducted at sites where there is a large number of chemicals to be carried through the quantitative risk assessment. As indicated in Section 5.8 of RAGS, chemicals detected in at least one sample in a given medium should be included in the quantitative risk assessment (unless they are appropriately and optionally screened out).

The Evergreen Manor site is located in EPA Region 5 and is not bound by Region 8 guidance. The list of references at the end of the comments did not include a specific reference for EPA 1998, so EPA is not certain what guidance EPA 1998 refers to.

Comment PRP-46: *Tetrachloroethylene, chloroform, benzene and methylene chloride are four of the five chemicals detected in groundwater but all of these were detected at a frequency of less than 5%. These chemicals should have all been eliminated from the risk assessment.*

EPA Response PRP-46: RAGS (Section 5.9) does not indicate that chemicals must be screened out in a risk assessment, only that screening may be appropriately conducted at sites where there is a large number of chemicals to be carried through the quantitative risk assessment. As indicated in Section 5.8 of RAGS, chemicals detected in at least one sample in a given medium should be included in the quantitative risk assessment (unless they are appropriately and optionally screened out).

Comment PRP-47: *The regulatory screen used by EPA's contractor for chloroform is 0.02 mg/L or 20 parts per trillion, which is an unusually low standard, and lower than can typically be achieved by standard analytical method, thus ensuring that chloroform is selected even though it may never have been found at the Site. The safe drinking water act establishes a goal for the drinking water supply as 100 mg/L (EPA 1999 and 2002). So a goal of 1/10th of this, or 10 mg/L, would be more appropriate. Even if Illinois' lower standard is employed, then 0.2 mg/L (200 parts per trillion) would be appropriate for chloroform.*

EPA Response PRP-47: See EPA Response PRP-46.

Comment PRP-48: *Acetone was correctly screened out of the risk assessment based on its maximum concentration being below its regulatory standard (Table 2.1, Appendix A, COPC Flag column). However, it was subsequently included in the risk assessment calculations. There is clearly an error in EPA's contractor's work.*

EPA Response PRP-48: As indicated by the table, the maximum concentration of acetone (100 ug/l) was detected above the screening level of 61 ug/l and was included in the quantitative risk assessment. The "N" in the COPC Flag column was a typographical error and should have been "Y".

Comment PRP-49: *Based on the use of a frequency of detection screen and regulatory screen, the only chemical detected frequently enough and above its regulatory screen was TCE. This is the only chemical that should have been evaluated in the risk assessment.*

EPA Response PRP-49: See EPA PRP Responses PRP-43, PRP-44 and PRP-45.

Comment PRP-50: *EPA's contractor selects three exposure pathways for evaluation in Section 9.3.2. None of these three pathways are complete because no resident at the Site is using groundwater. All of the residents are currently supplied by a municipal water supply.*

EPA Response PRP-50: See EPA Response PRP-1.

Comment PRP-51: *There is no exposure to the residents and so there is no risk via these non-existent exposure pathways. The risk assessment should have been halted at this point because items (3) and (4), an exposure contact point and an exposure route are not complete. The remediation goals implemented at the Site should have been the regulatory goals, or the MCL.*

EPA Response PRP-51: See EPA Response PRP-1. As indicated in Section 4.2.1 of "Guidance on Remedial Action for Contaminated Groundwater at Superfund Sites" (OSWER Directive 9283.1-02), remediation goals should also consider aggregate risk in addition to MCLs and other regulatory goals.

Comment PRP-52: *EPA's contractor states that, "A distinct plume was not recognizable at the site" and they use this as a justification to use the maximum groundwater concentration. The lack of a clear groundwater plume indicates that groundwater is becoming cleaner over time. EPA's contractor does not state the other obvious fact, which is that the maximum concentrations of contaminants are barely above the MCL for PCE and TCE, and below the MCL for all other contaminants. Under these circumstances, it is not usual to continue evaluating groundwater at the Site. A better way of representing this is, "A distinct plume was not recognizable at the Site because the Site is almost within regulatory groundwater limits." Further, EPA's contractor ignores guidance from EPA when determining an exposure point concentration. EPA guidance (EPA 1994b, EPA 1989, EPA 2002b) states that the 95% upper confidence limit (UCL) of the mean should be used when estimating the risk from groundwater. This guidance was developed for just this situation. If the concentrations of contaminants in groundwater are over an area (at low concentration) then potential exposure to receptors will also be over a wide geographic area and over an extended period of time, hence the use of an average is appropriate. There is an adequate data set and a 95% UCL is the appropriate measure of an exposure concentration. The use of the maximum detected concentration is inappropriate and suggests that an elevated risk may exist where there is none.*

EPA Response PRP-52: See EPA Response PRP-2 and PRP-3. EPA 1994b is an EPA Region 8 guidance document. The Evergreen Manor site is in Region 5 and is not bound by Region 8 guidance.

Comment PRP-53: *In the risk characterization Tables 8.1 CT, 8.1 RME, 8.2 CT, 8.2 RME, 8.3 CT, 8.3 RME the risks are marked as the Total Hazard Index. This is incorrect; the risks are excess lifetime cancer risks.*

EPA Response PRP-53: EPA agrees that the bottom of the table incorrectly labeled excess lifetime cancer risks as Total Hazard Index. However, the conclusions of the risk assessment remain unchanged.

Comment PRP-54: *The exposure rates provided in the risk assessment would be appropriate if a risk assessment were necessary. In particular, the inhalation rates of 15 cubic meters per day (m3/day) for an adult is appropriate for estimating risks and should have been used in the revised inhalation risk assessment, as discussed below.*

EPA Response PRP-54: The inhalation rate of 20 m3/day EPA used in the vapor risk assessment is a reasonable upper-bound value for adult residents and is acceptable for use (RAGS Exhibit 6-16 and "Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors" (OSWER Directive 9285.6-03).

Comment PRP-55: *The uncertainty analysis presented in this section suggests that the risk assessment overestimates the risk by a single order of magnitude (RI Section 9, p. 24). This overestimate is too low. It incorrectly assumes that there is exposure when in fact there is no exposure through groundwater wells.*

EPA Response PRP-55: See EPA Response PRP-1.

Comment PRP-56: *Table 9.4, Summary of Uncertainty Analysis provides EPA's contractor's view of the uncertainty in the risk estimate. EPA's contractor characterizes the potential for overestimation in the environmental data as "Low". This is incorrect and inaccurate. The potential for over estimation is "High" relative to the action level. The maximum groundwater value was used for the risk estimate and not the appropriate 95% UCL required by EPA Guidance. This overestimation leads to a relatively high calculated risk where there is none above EPA's acceptable risk range.*

EPA Response PRP-56: See EPA Response PRP-3.

Comment PRP-57: *In Table 9.4, EPA's contractor characterizes the potential for overestimation in exposure parameters as "Low". This is incorrect and inaccurate. The potential for over estimation is "High" relative to the action level because there is no exposure via the non-existent exposure pathway incorrectly presumed to exist by EPA's contractor.*

EPA Response PRP-57: See EPA Response PRP-1.

Comment PRP-58: *EPA's contractor cites the EPA's Vapor Intrusion Guidance (EPA 2002c), however they do not follow this guidance. This guidance requires an evaluation of the groundwater concentrations to Target Groundwater Concentrations provided within the guidance. This was not done either for the Site as a whole, or at the specific locations where indoor air data was collected. If that comparison had been made using the appropriate groundwater concentrations, either the 95% UCL of the groundwater data, or the actual 2002 groundwater concentrations at/near the residences sampled, it would be shown that the Target Groundwater Concentrations were not exceeded for any contaminant. The Target Groundwater Concentrations for TCE and PCE are 5 µg/L*

respectively. These concentrations are not exceeded at the Evergreen Manor Site (see later comments).

EPA Response PRP-58: As indicated in Section 1B of the Vapor Intrusion Guidance, EPA personnel are free to use and accept other technically sound approaches and to modify the approach recommended in the guidance.

EPA did not use the Target Groundwater Concentrations as a screening tool because shallow groundwater at and near the water table in the residential area has not been characterized. Also, in this draft guidance, when the theoretical groundwater concentration that could cause soil gas and indoor air concentrations above screening levels is below the MCL, the Target Groundwater Concentration for that chemical defaults to the MCL. The MCL is a drinking water standard based on ingestion, not on concentrations that could pose a risk via vapor intrusion. Because the Target Groundwater Concentrations for TCE, PCE and other groundwater contaminants detected at the Evergreen Manor site defaulted to the MCL, in an effort to be conservative, EPA did not use the Target Groundwater Concentrations as a screening tool.

Comment PRP-59: *The data evaluation step indicates the approach used by EPA's contractor to determine if indoor and outdoor air samples were above risk based air criteria. EPA's contractor selected the most conservative of the criteria available, in this case those developed by Region 9. This selection of the most conservative screen is inappropriate because it is inconsistent with EPA's Vapor Intrusion Guidance, which is appropriately based on EPA's methodology for inhalation risk assessment (EPA 2001).*

EPA Response PRP-59: See EPA Response PRP-46.

Comment PRP-60: *EPA's contractor conducts the air evaluation with no regard to the actual or potential concentration of contaminants in groundwater beneath each residence. In the Introduction (Section 1.1) and in Section 5.4 the stated objective is to determine whether a relationship exists between the VOC containing groundwater and any VOC concentrations measured in ambient air. However, in this section and later in the report, EPA's contractor only attempts to show that the contaminants are present in groundwater and makes no attempt to show that groundwater is the actual or potential source of indoor air chemicals. The data do not support such a connection.*

EPA Response PRP-60: EPA evaluated groundwater concentrations as a potential source of vapor contamination in Section 5.4 of the Air Sampling Report. However, as discussed in Section 8.4 of the Air Sampling Report, shallow groundwater at and near the water table in the residential area has not been characterized and there are many uncertainties and data gaps concerning the vapor intrusion pathway. These will be addressed as part of EPA's selected remedy and will be used to determine where additional vapor monitoring is necessary.

Comment PRP-61: *The comparison of indoor air data to the criteria in no way links the sources of the contaminants to groundwater. Rather, the data for indoor air show chemicals that are due to indoor air sources. EPA's contractor fails to pursue this line of reasoning and so is actually measuring background rather than groundwater derived contaminants. Further, the risks calculated are due to chemicals from indoor air sources and not groundwater. This is discussed in more detail in later comments.*

EPA Response PRP-61: See EPA Responses PRP-8 and PRP-60.

Comment PRP-62: *Based on what they reported, EPA's contractor did not remove chemical sources from the residences at the time of sampling, thus the potential for contamination from indoor chemicals sources remained even though they were aware of the problem. This error led to elevated indoor air results and it is the risk from these chemicals that is being measured.*

EPA Response PRP-62: See EPA Response PRP-8.

Comment PRP-63: *The data presented in Table 5-3 for residence B show that benzene is at higher concentrations on the first floor compared to the basement. This implies that the chemicals are not entering the house through the basement but via the first floor. This is not discussed by EPA's contractor in their evaluation of the data, but clearly is important with respect to the source of the chemicals.*

EPA Response PRP-63: This is an important issue that is discussed in Section 7.5.3.2 and in Tables 7-3 and 7-3b of the Air Sampling Report. This issue is also discussed in Section 7.2.1 and in Tables 7-b, 8-a and 8b of the ROD. See also EPA Response PRP-8.

Comment PRP-64: *The literature available on background indoor air includes a number of papers showing levels of chemicals such as benzene, TCE and PCE in indoor air. Some of the most recent data from Denver shows background benzene levels at 4 µg/m3 in residences, most without attached garages, and a maximum concentration of 64 µg/m3 (Foster, 2002). Other studies show the same ranges for benzene (MADEP 1998; Brown 1994; EPA IAQ, 1991).*

EPA Response PRP-64: See EPA Response PRP-8.

Comment PRP-65: *Residence B has an attached garage where gasoline and other chemicals are stored. The sources of benzene in the house and the lack of benzene in groundwater are not discussed in the evaluation of the data. This information should have been used to eliminate this compound from evaluation at the Site.*

EPA Response PRP-65: See EPA Responses PRP-7, PRP-8 and PRP-63.

Comment PRP-66: *The presence of chemical sources to indoor air other than groundwater is supported by the presence of methylene chloride at highly elevated concentration in indoor air but not in soil vapor. Groundwater is not the source of indoor air chemicals to Residence B because there is little or no methylene chloride in soil vapor. Methylene chloride should have been eliminated as a chemical of concern due to its absence in groundwater and the low levels in soil vapor. Leaving the chemical in the report as a chemical of concern is misleading and allows for the inclusion of risks that are not attributed to groundwater.*

EPA Response PRP-66: See EPA Response PRP-60. Methylene chloride was detected at low levels in a groundwater sample collected from CPT-03. As indicated in Section 7.5.3.2 and Tables 7-2 and 7-3 of the Air Sampling Report, Homes A and B had much higher levels of methylene chloride in indoor air than in soil gas. This indicates that the majority of the methylene chloride in these homes is household related. Because of this, EPA did not include methylene chloride in the indoor air risk

calculations for Homes A and B. See also Tables 7-a to 7-d and Tables 8-a and 8-b in the ROD.

Comment PRP-67: *Residence C has higher concentrations of chemicals other than from groundwater (specifically benzene, ethyl benzene, xylene, toluene and methylethylketone), on the first floor compared to the basement, again indicating that groundwater is not the source of these chemicals.*

EPA Response PRP-67: See EPA Response PRP-60. As indicated in Table 5-4 of the Air Sampling Report, the first floor and basement concentrations of benzene, ethyl benzene, xylene, toluene and methylethylketone are actually very similar at Home C (e.g., 0.84 vs. 0.76 ug/m3; 0.8 vs. 0.6 ug/m3; 1.7 vs. 1.6 ug/m3; 11 vs. 8.1 ug/m3 and 2.9 vs. 2.4 ug/m3, 0.84 vs. 0.76 ug/m3), but much higher in soil gas (25, 18, 60, 150 and 16 ug/m3), which indicates that groundwater could be the source of these chemicals.

Comment PRP-68 : *Residence D has higher concentrations of chemicals (specifically 1,1,1-trichloroethene, methylethylketone, chloroform, benzene, ethyl benzene, xylene, toluene, methylene chloride and PCE), on the first floor compared to the basement, again indicating that groundwater is not the source of these chemicals.*

EPA Response PRP-68: See EPA Response PRP-60. As indicated in Section 7.5.3.2 and Table 7-5 of the Air Sampling Report, EPA agrees that chloroform is not site-related and that most of the benzene and ethyl benzene is most likely household related. Because of this EPA did not include these chemicals in the indoor air risk evaluation for Home D. As indicated in Table 5-5 of the Air Sampling Report, 1,1,1-trichloroethene was detected at similar levels on the first floor and in the basement (0.28 and 0.21 ug/m3) and at much higher levels in soil gas (3.6 ug/m3) indicating that groundwater could be the source of this chemical at Home D. EPA also considers the first floor, basement and soil gas concentrations of methylene chloride and PCE to be similar at Home D (1.3, 1.0 and 0.74 ug/m3; and 1.3, 0.82 and 0.94 ug/m3). Because of the uncertainties associated with shallow groundwater at and near the water table in the residential area, EPA included 1,1,1-trichloroethene, methylene chloride and PCE in the indoor air risk evaluation at this Home.

The Air Sampling Report did not compare basement and first floor concentrations of methylethylketone, xylene and toluene because these chemicals were below screening levels and did not contribute significantly to the site-related risk calculations for this home, which are below acceptable levels. However, in Table 8-b of the ROD, EPA excluded xylene and toluene from the risk calculations for this home. Although EPA included methyethylketone in the indoor air risk calculations for Home D in Table 8-b of the ROD, EPA agrees that most (but not all) of the methylethylketone is probably household related. In any case, the total site-related risks were below screening levels and the risks from methylethylketone were calculated as being 0.027 which is well below EPA's acceptable hazard index of 1.0.

Comment PRP-69: *In the risk assessment prepared by EPA's contractor in 2001 they conducted a groundwater evaluation showing a summary of groundwater information for the Site. EPA's contractor should have prepared a statistical evaluation of the 2002 groundwater data as part of this analysis. A statistical evaluation of the data would show groundwater concentrations at the time of indoor air sampling; it would provide*

average and 95% UCL concentrations and would provide a basis for demonstrating any potential relationship between groundwater and indoor air.

EPA Response PRP-69: See EPA Response PRP-3 and PRP-29. A statistical analysis would not be appropriate.

Comment PRP-70: *Specifically for Area A chemicals that exceed the indoor air criteria, the evaluation performed by EPA's contractor should have identified the following:*

- *Benzene was not detected in groundwater and only found in one sample collected by CPT. No samples were above the regulatory criteria, the MCL, of 5 ug/L and benzene should have been eliminated on this basis alone.*
- *Chloroform was not detected in any groundwater or CPT sample. It should have been eliminated from the risk assessment and eliminated as an indoor air chemical of concern.*
- *Methylene chloride data are not presented in Table 5.11. Groundwater data for this compound are important and should be presented to allow for the elimination of this chemical. Based on the groundwater database methylene chloride was not detected in groundwater and the chemical should have been eliminated from the risk assessment and eliminated as an indoor air chemical of concern.*
- *PCE was detected in three groundwater samples and one CPT sample. In none of the samples in Area A was the concentration above the regulatory criteria of 5 ug/L and all but one sample was qualified (either inaccurately measure or estimated). The 95% UCL of the data for the Site should have been calculated. If EPA's contractor would have calculated a 95% UCL concentration for Site wide PCE they would have found it to be 3.5 mg/L, which is below the MCL and below the Vapor Intrusion Guidance Target Groundwater Concentration.*

EPA Response PRP-70: See EPA Responses PRP-3, PRP-7, PRP-8, PRP-58 and PRP-69. As indicated in Table 5-14 of the Air Sampling Report, methylene chloride was detected at low levels in groundwater in CPT-03. See EPA Response PRP-46. As indicated in Section 7.5.3.2 and Table 7-2 of the Air Sampling Report, EPA agrees that chloroform is not site-related and did not include chloroform in the site-related risk evaluation for Home A.

Comment PRP-71: *In Area A, chloroform was not found in soil vapor and should have been eliminated from further analysis.*

EPA Response PRP-71: As indicated in Section 7.5.3.2 and Table 7-2 of the Air Sampling Report, EPA agrees that chloroform is not site-related and did not include chloroform in the site-related risk evaluation for Home A or any of the other homes.

Comment PRP-72: *Area B and C are grouped together for their groundwater analysis and for chemicals that exceed the indoor air criteria, EPA's contractor should have calculated and evaluated groundwater statistics for the Site for use in this area, which would have shown the following:*

- *Benzene was not detected in groundwater in any of the sampling events and should have been eliminated from the analysis.*
- *Chloroform was detected in one sample at an estimated concentration of 0.9 ug/L.*

- *The 95% UCL of the data should have been calculated in Area B and C.*
- *Ethyl benzene was not detected in groundwater in any of the sampling events and should have been eliminated from the analysis.*
- *Methylene chloride data are not presented in Table 5.11. Groundwater data for this compound are important and should be presented to allow for the elimination of this chemical. Based on the groundwater database methylene chloride was not detected in groundwater and the chemical should have been eliminated from the risk assessment and eliminated as an indoor air chemical of concern.*
- *PCE was detected in two groundwater samples at an estimated 0.9 and 2 ug/L, and one at 2 ug/L. No samples above the regulatory criteria of 5 ug/L. The 95% UCL of the data for the Site of 3.5 mg/L should have been used.*

EPA Response PRP-72: See EPA Responses PRP-3, PRP-7, PRP-8, PRP-58 and PRP-69. As indicated in Table 5-14 of the Air Sampling Report, ethyl benzene was detected at low levels in groundwater in CPT-9 and methylene chloride was detected at low levels in groundwater in CPT-03. See EPA Response PRP-46. As indicated in Section 7.5.3.2 and Table 7-2 of the Air Sampling Report, EPA agrees that chloroform is not site-related and did not include chloroform in the site-related risk evaluation for Homes B or C.

Comment PRP-73: *A more thorough evaluation of groundwater data in Area D would have revealed the following:*

- *Benzene was not detected in groundwater in any of the sampling events and should have been eliminated from the analysis.*
- *Chloroform was not detected in groundwater in any of the sampling events and should have been eliminated from the analysis.*
- *Ethyl benzene was not detected in groundwater in any of the sampling events and should have been eliminated from the analysis.*
- *PCE was not detected in groundwater in any of the sampling events and should have been eliminated from the analysis.*

EPA Response PRP-73: See EPA Responses PRP-7, PRP-8 and PRP-29. As indicated in Section 7.5.3.2 and Table 7-5 of the Air Sampling Report, benzene, chloroform and ethyl benzene were considered to be mostly household related at Home D and were excluded from the indoor air risk calculations for that home. Because the first floor, basement and soil gas concentrations of PCE were similar at Home D (1.3, 0.82 and 0.94 ug/m3), and because of the uncertainties associated with shallow groundwater at and near the water table in the residential area, EPA included PCE in the indoor air risk evaluation at this Home.

Comment PRP-74: *EPA's contractor provides adequate justification to eliminate benzene from the risk assessment analysis because, as they state, "it was found in low concentrations, infrequently and near to roadside contamination." In residences it is found with attached garages and in the first floor at a level higher than the lower floor. Nevertheless it was incorrectly retained in the risk assessment resulting in an artificially elevated risk that makes the Site appear to have a higher risk. This is also of concern because it leaves the public with the mis-impression that the groundwater is a problem rather than informing the public about internal sources of chemicals that should be reduced and managed.*

EPA Response PRP-74: See EPA Responses PRP-7, PRP-8 and PRP-29. EPA personally spoke with the residents at the 4 homes EPA sampled and with other residents in the area about the level of risk that was/can be posed by household-related chemicals and how these risks could be reduced and managed. This was also made clear in EPA's February 2003 Air Sampling Fact Sheet and at the February 2003 availability session and public meeting.

Comment PRP-75: *EPA's contractor informs that the levels of chloroform in indoor air are probably due to the public drinking water supply at concentrations up to 32 ug/L. Retaining chloroform in the risk assessment leaves the public with the mis-impression that the groundwater is the source of this problem; rather than informing the public about potential problems with chlorination of the water supply.*

EPA Response PRP-75: See Section 7.5.3.1 and Tables 7-2 to 7-5. Chloroform was excluded from the site-related risk calculations. EPA agrees that the chloroform found at the site is most likely household and public-water supply related and made this clear in the February 2003 Air Sampling Fact Sheet and the July 2003 Proposed Plan.

Comment PRP-76: *EPA's contractor provides adequate justification to eliminate PCE from the risk assessment analysis because, as they state, it was found in low concentrations and infrequently. There are a number of sources of this chemical in indoor air and yet this chemical is retained for analysis throughout the risk assessment. PCE is found in background indoor air. In data collected recently in Denver, (Foster 2002) it was shown that PCE concentrations vary in indoor air up to 42 mg/m3, which is higher than the highest PCE concentration found at the Site. The average background at the Site in Denver is higher than most samples at the Evergreen Manor Site. It should also be noted that PCE is still used in the dry cleaning process and EPA's contractor did not review this issue with residents prior to sampling indoor air.*

EPA Response PRP-76: See EPA Responses PRP-8 and PRP-46.

Comment PRP-77: *TCE is detected in groundwater and never detected in indoor air. This is very informative and indicates that the vapor pathway is not a source of chemical exposure at this Site. If vapor migration from groundwater to air were a significant pathway at this Site, TCE would be found in indoor air. This implies that compounds that do not migrate as a vapor in a similar way to TCE also should not be found in indoor air. TCE should have never been included in the indoor air risk assessment.*

EPA Response PRP-77: TCE was not detected in indoor air and was not included in the indoor air risk assessment. It was detected in soil vapor at Homes C and D and was included in the soil vapor risk calculations for those homes. EPA's vapor intrusion investigation was a one-time sampling event at only 4 of almost 300 homes in the area. Property and residence-specific factors can influence indoor air concentrations and there is some uncertainty as to whether the 4 residences EPA sampled provide a reasonable characterization of vapor intrusion in all the homes in the area. Indoor air concentrations can also be affected by seasonal variations and EPA's one-time sampling event may not provide an accurate assessment of longer-term average indoor levels. Also, because shallow groundwater at and near the water table in the residential area has not been characterized, EPA is also uncertain whether the 4 homes that EPA sampled were located over the highest remaining areas of groundwater contamination, or whether other homes could be at a greater risk. As indicated in Sections 2.9.3,

2.11.1 and 2.11.3 of the ROD, the additional vapor investigations and monitoring as needed will ensure that potential risks from site-related soil vapors remain below acceptable levels.

Comment PRP-78: *The Slope Factor and associated Unit Risk Factor used to calculate risk in the Air Report is based on EPA's Draft Trichloroethylene Health Risk Assessment: Synthesis and Characterization (External Review Draft; EP A/600/P01/002A). This document and the dose-response relationship developed in it are flawed. The draft Trichloroethylene Health Risk Assessment (THRA) lacks the scholarship and objectivity necessary to derive appropriate estimates of risk for TCE because it contains many internal contradictions and relies heavily on speculation rather than hard evidence in making its case for carcinogenicity. The Slope Factor within this unapproved draft document should not have been used in the risk assessment.*

EPA Response PRP-78: U.S. EPA's Superfund Health Risk Technical Support Center issued a memo recommending that risks from TCE exposure be evaluated using the updated toxicity values in Trichloroethylene Health Risk Assessment: Synthesis and Characterization (EPA/600/P-01/002A) August 2001 External Review Draft. The Superfund Health Risk Technical Support Center memo was issued on July 15, 2003 and a copy is in the Administrative Record for the site. EPA calculated the TCE vapor risks at the site using these updated toxicity values.

Comment PRP-79: *Ecolab's critique joins that of others (Air Force, 2001) and asserts that the authors of the draft THRA have included studies without consideration of their quality or appropriateness for assessing human health risks. They have used epidemiologic and animal data selectively and, in some cases, have misrepresented those data. They have relied heavily (and nearly exclusively) on an inappropriate and inadequate analysis of the epidemiology literature and failed to distinguish between the concepts of association and causation. The authors of the draft THRA assigned to TCE effects that have been observed in populations (1) which were exposed to many different xenobiotics and (2) in which TCE exposures were not established or quantified. They used endpoints in target organs identified in animal studies regardless of the fact that they have been shown not to be relevant to humans and dismissed well-established hypotheses and instead presented and based toxicity values on speculative modes of action that often are inconsistent with the body of data. The authors based the assessment on sensitive subpopulations when there is no convincing evidence that they exist. The authors used poorly chosen studies as the basis for calculating toxicity values and failed to realize that increasing knowledge is supposed to reduce uncertainty. They have been inconsistent both in their derivation of the points of departure and in their use of uncertainty factors in the development of toxicity values. In short, the classification of TCE as "highly likely to produce cancer in humans" appears to be based on an unproven hypothesis rather than on sound scientific evidence.*

EPA Response PRP-79: See EPA Response PRP-78.

Comment PRP-80: *EPA's contractor used the Cancer Slope Factor for PCE provided in the Vapor Intrusion Guidance and by the Cal EPA Air Toxics Hot Spot Program. Any information used in a risk assessment should be reviewed to ensure that it is current. The Inhalation Slope Factor for PCE was removed from EPA's Integrated Risk Information System (IRIS) and a new value is in the process of being developed by EPA. However, EPA has not issued the new value on its IRIS database. In the*

absence of a Slope Factor on IRIS the National Center for Exposure Assessment (NCEA) issues provisional Slope Factors. When NCEA was contacted for a provisional Inhalation Slope Factor for PCE they provided an value that was different for that used by EPA's contractor. The value was the same as that used by EPA's contractor in their 2001 risk assessment. The Slope Factor provided to us by the NCEA was 2 x 10-3 (mg/kg/day)-1 this value should be used.

EPA Response PRP-80: OSWER Directive No. 9285.7-75 (June 12, 2003) supports the use of an inhalation unit risk of 5.9E-6 $(ug/m3)^{-1}$ for PCE, which is the Cancer Slope Factor for PCE provided in the Vapor Intrusion Guidance and the Cal EPA Air Toxics Hot Spot Program, and used in the Evergreen Manor vapor risk assessment. A copy of this directive is in the Administrative Record for the site.

Comment PRP-81: *The equation provided in Section 7.5 for the estimation of cancer risk is confusing and incorrect. The exposure point concentration for chemicals in indoor air is provided in the units of milligrams per kilogram (mg/kg), but was actually measured in micrograms per cubic meter (µg/m3). The risk based concentrations in the equation are also in units of milligrams per kilogram (mg/kg), but was actually calculated in micrograms per cubic meter (µg/m3).*

EPA Response PRP-81: The equations for estimating cancer and noncancer risks in Section 7.5 listed the exposure point concentrations and cancer and non-cancer risk based concentrations in mg/kg instead of ug/m3. However, the actual calculations were performed by dividing the exposure point concentration by the risk based concentration and, since both values used were in ug/m3, yield the correct results.

Comment PRP-82: *The method used to calculate risk is inconsistent with the risk assessment prepared in 2001, and is more conservative. The exposure assumptions developed in the 2001 risk assessment assumed an adult inhaling 15 m3/day of air per day. This risk re-assessment uses the California and Vapor Intrusion Guidance default inhalation assumptions of 20 m3/day. These are screening tools and should not have been used to estimate risk.*

EPA Response PRP-82: See EPA Response PRP-54.

Comment PRP-83: *The risk calculations conducted in Table 7.2 for each of the four exposure areas calculates risk for indoor air and for soil vapor, assuming a soil vapor attenuation factor of 0.1. The risk calculation is generally conducted in the absence of indoor air data to gain an understanding of what concentrations in indoor air might look like. To use these data as if they are indoor air and then select them as representing indoor air risks is completely inappropriate. The actual risk to the resident is the indoor air risk found by evaluating the indoor air data and not the hypothetical soil vapor risk.*

EPA Response PRP-83: EPA used a soil vapor attenuation factor of 0.1 at the Evergreen Manor site because EPA collected the soil gas samples at depths consistent with the base of each home's foundation. As indicated in EPA's Vapor Intrusion Guidance (Appendix F, Section 4), an attenuation factor of 0.1 represents a reasonable upper-bound value for soil gas samples collected beneath or within 5 feet of a home's foundation.

Comment PRP-84: *In Table 7.2 EPA's contractor indicates their understanding of the relationship between groundwater and indoor air with the column, "Could Chemical*

Concentration Be Site Related." This column reflects a failure to properly understand the vapor intrusion pathway. Since benzene is never found in groundwater it is not Site related. Since TCE is never found in indoor air, it is not an indoor air problem (Table 7.2 Area B). Similarly, benzene and methylene chloride are never found in groundwater. Therefore, they cannot be an indoor air problem (Table 7.2 Area C).

EPA Response PRP-84: See EPA Responses PRP-7, PRP-8, PRP-29 and PRP-77. As indicated in Table 5-14 of the Air Sampling Report, methylene chloride was detected at low levels in groundwater in CPT-03.

Comment PRP-85: *When the compounds not found in groundwater are eliminated there are only two chemicals for which indoor air risks could be calculated as being due to groundwater. One of these chemicals, TCE, was never found in indoor air and the other, PCE, is also associated with indoor air chemicals such as dry cleaning, and household products. This chemical is present in very low concentrations in ground water (95% UCL = 3.5 mg/L). Even if one considers the risk to be associated with groundwater, which it is not, the indoor air risk at the Site are within the 1 in 1 million risk to 100 in a million risk range. By including chemicals that are not related to groundwater, EPA's contractor is showing the Site groundwater to represent a risk where there is in fact no risk from groundwater.*

EPA Response PRP-85: See EPA Responses PRP-3, PRP-7, PRP-8, PRP-29 and PRP-77.

Comment PRP-86: *In summary, indoor air measurements are consistent with indoor air chemicals from residential sources and not from groundwater. Studies of indoor air that demonstrate this fact include Foster et. al., 2002; Kurtz and Folkes 2002; MADEP 1998; Brown 1994; EPA IAQ, 1991.*

EPA Response PRP-86: See EPA Responses PRP-7 and PRP-8.

Comment PRP-87: *On August 26, 2003, EPA released a letter that contained a one page addendum to Section 9, Risk Assessment, of the Weston 2001 Remedial Investigation Report (Weston, 2001). This addendum, titled "Recalculated Cancer Risk For Adult Exposure to Groundwater Using Reasonable Maximum Exposure Assumptions in 2001 Risk Assessment With Revised Toxicity Values For TCE and PCE and 2002 Groundwater Data" was a series of risk re calculations for an adult hypothetically exposed to groundwater. This spreadsheet contained no text providing the source of the information contained within it, except a reference to Weston's 2001 risk assessment. This is inappropriate; calculations that form the basis for remedial decisions should be fully transparent, documented and understandable to all stakeholders and the public. EPA's contractor should have provided a full description of the methods used.*

EPA Response PRP-87: The August 2003 risk update spreadsheet indicates (see the top of the spreadsheet) that the parameters used to evaluate the updated risks were consistent with those in the Risk Assessment in Section 9 and Appendix A of the 2001 RI Report. Because of this, the units for these standard exposure factors were not included on the spreadsheet. However, the spreadsheet did list each parameter by the commonly used acronym (e.g., EF), the input value for each parameter (e.g., 350) and the full equations and toxicity factors used to calculate the risks.

Comment PRP-88: *If EPA's contractor's 2001 risk assessment is the basis for the risk assessment, it incorrectly assumed that no remedy had been implemented at the Site and local groundwater was a source of risk via ingestion, dermal contact and inhalation. This assumption is incorrect because a groundwater remedy is in place and residents are exposed to consuming the groundwater.*

EPA Response PRP-88: See EPA Response PRP-1.

Comment PRP-89: *If the spreadsheet provided by EPA's contractor uses methodology based on EPA's 2001 risk assessment, as indicated in the title, the method omits the child exposure scenario from the overall calculation of risk. We recognize that a child/adult risk scenario would result in higher risks; however, we do not believe this method is appropriate for inhalation risk estimates. Either method incorrectly assumes that no remedy had been implemented at the Site and local groundwater is the source of risk via ingestion, dermal contact and inhalation. This assumption is incorrect because a groundwater remedy is in place and no residents are consuming the groundwater.*

EPA Response PRP-89: See EPA Response PRP-1. The groundwater risk update was designed to use the exposure assumptions in the EPA-approved 2001 Risk Assessment for the site with updated toxicity values. Use of more conservative exposure factors may be appropriate for future risk evaluations.

Comment PRP- 90: *EPA's contractor used a groundwater concentration of 0.0079 (units not provided, but assumed to be milligrams per liter (mg/L)). This concentration could not be found in the Evergreen Manor groundwater database for any sampling event, including 2002 groundwater data as stated in the title. Indeed this datum is higher than any of the TCE or PCE concentrations ever reported by EPA in the 2002 data set but was nevertheless used to represent the TCE concentration across the entire Site.*

EPA Response PRP-90: See EPA Response PRP-2.

Comment PRP-91: *The highest groundwater concentration for TCE in the Evergreen Manor database was 0.0072 (J) mg/L. This value is marked with a "J" qualifier indicating the value was not accurately measured but estimated. A single estimated data point to represent an area should not be used for the purposes of quantitatively estimating risk and for selecting a final Site remedy.*

EPA Response PRP-91: See EPA Response PRP-2.

Comment PRP-92: *The highest unqualified, accurately measured, TCE concentration at this Site was 0.0047 mg/L. This concentration is below the MCL for TCE and therefore the site is in compliance with the groundwater ARAR for TCE.*

EPA Response PRP-92: See EPA Response PRP-2.

Comment PRP-93: *As noted above, it is more appropriate to estimate risks using the 95% UCL concentration of chemicals in groundwater. TCE and PCE groundwater concentrations are 0.0035 and 0.0025 mg/L, respectively, using 2002 data. If these concentrations were used in EPA's contractor's spreadsheet the actual risks calculated*

would be 4.7 x 10-5 and 2.76 x 2.76 x 10-5 with a summed risk of 7.47 x 10-5, which is less than 1 x 10-4 EPA's acceptable risk level.

EPA Response PRP-93: See EPA Response PRP-2 and PRP-3.

Comment PRP-94: *EPA's contractor used a method that is inconsistent with the Vapor Intrusion Guidance. If this method had been used the results would have been lower still. If the appropriate 95% UCL concentrations were used in EPA's contractor's spreadsheet with an adult scenario, even assuming an inhalation rate of 20 m3/day, rather than 15 m3/day, the actual risks would be 5.98 x 10-5 and 2.76 x 10-5 with a summed risk of 3.46 x 10-5, which is less than 1 x 10-4, EPA's acceptable risk level.*

EPA Response PRP-94: The groundwater risk update was designed to use the exposure assumptions in the EPA-approved 2001 Risk Assessment for the site with updated toxicity values. See EPA Response PRP-3. It is not clear what Vapor Intrusion Guidance exposure method Comment PRP-94 is referring to.

Comment PRP-95: *EPA's contractor used Slope Factor for TCE and PCE that are not listed on IRIS. If appropriate Slope Factors had been used the results would have been lower still. If the 95% UCL concentrations were used in EPA's contractor's spreadsheet with an adult scenario, even assuming an inhalation rate of 20 m3/day and the old Slope Factors that are either NCEA provisional values (PCE) or the old Slope Factor (PCE and TCE) the actual risks would be 1.3 x 10-6 and 2.76 x 10-5 with a summed risk of 3.3 x 10-6, which is less than 1 x 10-4 EPA's acceptable risk level.*

EPA Response PRP-95: See EPA Responses PRP-78 and PRP-80.

Comment PRP-96: *Based on these calculations, which are more consistent with EPA's guidance than the work conducted by EPA's contractor, the site should not be the subject of further investigations.*

EPA Response PRP-96: See EPA Response PRP-1. As indicated in "Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions" (OSWER Directive 9355.0-30):

> *Where the cumulative carcinogenic site risk to an individual based on reasonable maximum exposure for both current and future land use is less than 10-4 and the non-carcinogenic hazard quotient is less than 1, action generally is not warranted...However, if MCLs or non-zero MCLGs are exceeded, action generally is warranted.*

As also indicated in EPA Response PRP-2, the NCP Preamble specifies that cleanup levels (e.g., MCLs) "should generally be attained throughout the contaminated plume." Because residents may draw water from anywhere in the aquifer, averaging chemical concentrations across the plume is not a protective method for determining whether cleanup levels have been attained.

Comment PRP-97: *PRP Comments 98 to 120 pertain to the Groundwater Data Evaluation Report (Redacted Version), Evergreen Manor Site, Roscoe, Illinois, Weston Solutions, Inc., July 2003. EPA's contractor suggests that the presence of any uncertainty is sufficient cause to perform additional work. Comments regarding the*

details of the unnecessary recommended supplemental work activities are provided, and can be summarized as follows:

- *EPA's contractor downplays the effectiveness of their own RI, etc.;*
- *EPA's contractor overestimates chemical exposure;*
- *The proposed work improperly addresses issues not related to this site;*
- *There is no correlation between concentrations in groundwater and indoor air;*
- *Ambient air PRGs are improperly applied to soil gas;*
- *The soil gas confirmation methodology is unreliable;*
- *EPA's contractor makes an unsupported DNAPL claim;*
- *Source identification is unwarranted because the implemented remedy is protective.*

EPA Response PRP-97: *Comment PRP-97 is a summary of Comments PRP-98 to PRP-120. Please see EPA Responses PRP-98 to PRP-120.*

Comment PRP-98: *In a single paragraph review of the RI, EPA's contractor uses the terms "limited sampling" (twice), "limited data", and "limited work" (Section 2, p. 6). None of these terms appear in the RI. To the contrary, the RI states that additional "soil and sediment sampling is not warranted, and no new monitoring wells are recommended at this time" (RI Section 11, p. 7).*

EPA Response PRP-98: The RI/FS is not complete until EPA issues a ROD for the site. The Evergreen Manor ROD is based on the RI as well as the more recent sampling and analysis presented in the Groundwater Data Evaluation Report and the Air Sampling Report, as well as other information in the Administrative Record.

Comment PRP-99: *EPA's contractor states that "[n]one of the investigations conducted to date represent a comprehensive and consistent evaluation of the overall conditions present at the site," (Section 6, p. 5). EPA's contractor goes on to state "variability in project objectives, sampling methods, parameters and frequency [of previous investigations] could lead to erroneous interpretation of data which in turn could lead to misinterpretation of actual site conditions" (Section 6, p. 6). If the RI is limited, inconsistent, non comprehensive, and leads to erroneous interpretation of data, then it is also likely not consistent with the requirements of the NCP. Alternately, if the RI fulfills the requirements of the NCP then the recommendation for an extensive investigation is largely unnecessary.*

EPA Response PRP-99: The Evergreen Manor ROD is based on the RI as well as the more recent sampling and analysis presented in the Groundwater Data Evaluation Report and the Air Sampling Report, as well as other information in the Administrative Record.

Comment PRP-100: *The RI is described as finding that "residential groundwater exposure risk estimates ranged from 4.6E 6 to 1.9E 5," (Section 2, p. 7). The fact that the removal action "effectively eliminated the residential well exposure pathway" (RI Section 11, p. 6) is omitted from the discussion of risk and that any evaluation of the groundwater exposure risk is therefore hypothetical.*

EPA Response PRP-100: See EPA Response PRP-1.

Comment PRP-101: *The highest TCE detection of 7.2 ug/L is consistently misreported without the "J" (estimated) qualifier in the text (Section 4, p. 6, Section 5, p. 7).*

EPA Response PRP-101: It is not necessary to report "J" qualifiers when referencing concentrations throughout the text. The "J" and other qualifiers for this (and the other) data are reported in Tables 5-4 and 5-5 of the Groundwater Data Evaluation Report. A "J" qualifier means that the chemical was positively identified but that the concentration is estimated. As indicated in EPA's Risk Assessment Guidance for Superfund Part A (RAGS) (p. 5-15):

> *...most of the laboratory qualifiers for both inorganic chemical data and organic chemical data (e.g., J, E, N) indicate uncertainty in the reported concentration of the chemical, but not in the assigned identity. Therefore, these data can be used just as positive data with no qualifiers or codes. In general, include data with qualifiers that indicate uncertainties in concentrations but not in identification.*

Comment PRP-102: *Chloroform was detected at a concentration of 0.23 ug/L in a sample collected from MW-02. This sample is evaluated (Section 4, p. 7 and p. 13) without regard for the suspect laboratory contamination of this sample as indicated by the concentrations in the field blank, which were "greater than 10 times the concentration detected in monitoring well MW-02" (Section 5, p. 9). In fact, EPA's contractor acknowledges that this result should be considered a non detect (Section 5, p. 9), but does not carry through on its own recommendation.*

EPA Response PRP-102: The presence of chloroform at more than 10 times the concentration in the blank sample was discussed in Section 5, p. 9 and in the conclusions presented in Section 7.1 of the Groundwater Data Evaluation Report.

Comment PRP-103: *The scope of work includes an investigation of PCE concentrations in municipal wells that are 1) beyond the site boundaries, and 2) currently attributed to solvent impacted material used in the construction of the well.*

EPA Response PRP-103: See Section 7.2.1, Recommendations for Groundwater Issues in the Groundwater Data Evaluation Report. This section does not mention an investigation of PCE concentrations in municipal wells. It is unclear what Comment PRP-103 is referring to.

Comment PRP-104: *"Due to the presence of the PCE based coating [on the well piping], and the distance between Evergreen Manor contaminated groundwater plume (both vertically and horizontally), it does not appear that the impacts observed in the groundwater samples collected from the NPPWD municipal wells is attributable to the site based on current data and information" (GDER Section 5, p. 10).*

EPA Response PRP-104: No response required.

Comment PRP-105: *Indoor air sampling indicated that potential cancer risks were within EPA's acceptable risk range.*

EPA Response PRP-105: Additional details concerning why the additional vapor investigations are needed are provided in Section 8 of the Air Sampling Report and Sections 2.7.1 and 2.7.3 of the ROD.

VOC-contaminated groundwater is flowing beneath approximately 300 homes and EPA found TCE, PCE and other potentially site-related contaminants in soil gas. EPA also found PCE and other potentially site-related contaminants in indoor air samples. Although none of the contaminants were detected above a risk level of 1 x 10-4, EPA's vapor intrusion investigation was a one-time sampling event at only 4 of almost 300 homes in the area. Property and residence-specific factors can influence indoor air concentrations and there is some uncertainty as to whether the 4 residences EPA sampled provide a reasonable characterization of vapor intrusion in all the homes in the area. Indoor air concentrations can also be affected by seasonal variations and EPA's one-time sampling event may not provide an accurate assessment of longer-term average indoor levels. Also, because shallow groundwater at and near the water table in the residential area has not been characterized, EPA is also uncertain whether the 4 homes that EPA sampled were located over the highest remaining areas of groundwater contamination, or whether other homes could be at a greater risk. As indicated in Sections 2.9.3, 2.11.1 and 2.11.3 of the ROD, the additional vapor investigations and monitoring as needed will ensure that potential risks from site-related soil vapors remain below acceptable levels .

Comment PRP-106: *Indoor air and soil gas samples did not correlate with groundwater concentrations. · "the highest PCE and TCE concentrations... [are located] where, historically, PCE and TCE concentrations in the residential wells have been either non detect or detected at concentrations below the drinking water standards" (Section 4, p. 12). "PCE and TCE concentrations in soil gas samples at much lower levels... [were found in] areas where, historically, high TCE concentrations have been reported in groundwater samples" (Section 4, p. 13).*

EPA Response PRP-106: EPA evaluated groundwater concentrations as a potential source of vapor contamination in Section 5.4 of the Air Sampling Report. However, as discussed in Section 8.4 of the Air Sampling Report and in Sections 6.5, 7.1 and 7.2 of the Groundwater Data Evaluation Report, shallow groundwater at and near the water table in the residential area has not been characterized and there are many uncertainties and data gaps concerning the vapor intrusion pathway. These will be addressed as part of EPA's selected remedy and will be used to determine where additional vapor monitoring is necessary. See also EPA Responses PRP-26 and PRP-29.

Soil gas samples may also not correlate well with groundwater results due to preferential pathways. For example, higher-permeability features (e.g., utility conduits) and ground cover (e.g., vegetation vs. paved surfaces) may induce vapor channeling along specific routes (see 8.4 in Air Sampling Report). Prior to the municipal water hook up in 1999-2000, household water discharged to septic systems was obtained from residential wells that drew water from the contaminated Evergreen Manor plume, and these septic systems may also be acting as a "secondary" site-related source of soil vapors.

Comment PRP-107: *A somewhat more cogent acknowledgment is provided later in the report, "Some of the highest levels of PCE and TCE concentrations in soil gas were found in areas with some of the lowest levels of groundwater contamination" (Section 7, p. 9).*

EPA Response PRP-107: See EPA Response PRP-106.

Comment PRP-108: *The analytes detected in indoor air are commonly associated with residential building materials (e.g., pressboard and paint) residential chemical use (e.g., gasoline for lawnmowers, solvents for hobbies and crafts, bleach for laundry), and secondary sources (e.g., dry cleaning solvent residual on laundry). Although widely known, this fact is not mentioned by EPA's contractor.*

EPA Response PRP-108: This was discussed in Section 8.5.2 of the Air Sampling Report and mentioned as necessary in the Groundwater Data Evaluation Report. See EPA Response PRP-8.

Comment PRP-109: *Significantly, EPA's contractor omits the fact that the indoor air sample results were within the range of typical residential "background" concentrations. Such background concentrations are generally attributed to building materials and residential chemical use.*

EPA Response PRP-109: See EPA Response PRP-8.

Comment PRP-110: *The conclusion strongly suggested by these facts is that soil gas and indoor air concentrations are fully explained by background concentrations associated with typical residential use.*

EPA Response PRP-110: See EPA Responses PRP-8, PRP-105 and PRP-106.

Comment PRP-111: *EPA's contractor, however, reaches an alternative conclusion which forms the basis of an extensive investigation of indoor air, soil gas, groundwater, and soil at up to 50 to 75 homes (Section 7, p. 11). Specifically, they downplay the results of their investigation with the statement, "it is not known whether a direct correlation exists between groundwater concentrations and the elevated soil gas concentrations" (Section 5, p. 22).*

EPA Response PRP-111: See EPA Responses PRP-8, PRP-105 and PRP-106.

Comment PRP-112: *The Southeast Rockford Superfund site provides a useful comparison for the scope of the work proposed at the Evergreen Manor Site. The Southeast Rockford site is much larger, includes a much larger population, and has concentrations of contaminants that are hundreds of times higher than the Evergreen Manor site. Even though previous investigations of Southeast Rockford indicated that "harmful levels of vapors were not found in homes near the sources of contamination," the IEPA plans to perform residential air sampling "to make sure that vapors from these contaminants were not seeping into nearby basements." (Update, Southeast Rockford Groundwater Contamination Superfund Project, Residential Indoor Air Sampling, Illinois Environmental Protection Agency, March 2003). The proposed work includes 10 houses in areas where the concentrations of TCE, PCE, 111-TCA and ethyl benzene in the groundwater were significantly higher than those at the Evergreen Manor site in 2002.*

EPA Response PRP-112: The selected remedy for the Evergreen Manor site is a site-specific cleanup plan designed to meet the remedial action objectives and data requirements of this site. The additional groundwater, residential well and vapor investigations conducted during predesign will be used to determine where additional long-term monitoring is necessary to ensure that the cleanup is progressing and that residents are not exposed to unacceptable levels of groundwater or vapor contaminants

during the cleanup. See EPA Responses PRP-1, PRP-26, PRP-29 and PRP-34 for additional explanations as to why this monitoring is needed. As indicated in Section 4.2.3 of the FS, Sections 2.9.3 and 2.11 of the ROD, and Section 7.2 in Appendix G of the ROD, the extent of the additional sampling and monitoring will be determined during the remedial design and will depend on the results of the pre-design investigations as well as the results of the long-term monitoring programs. The predesign investigations will ensure that the long-term groundwater, residential well and vapor monitoring is conducted in the appropriate locations and will generate greater confidence in the results and conclusions indicated by the data.

Comment PRP-113: *Potential cancer risks have been calculated for soil gas (GDER Section 5, p. 21). Soil gas is also compared to RBC concentrations (GDER Section 7, p. 1). However, there is no direct exposure scenario for soil gas because it occurs in a solid material.*

EPA Response PRP-113: The soil gas information presented in the Groundwater Data Evaluation Report is a summary of information in the Air Sampling Report. As explained in Section 9.1 of the Air Sampling Report, soil gas measurements were used to predict indoor air concentrations to determine if there was a potential for vapors to migrate into residences above risk-based levels.

Comment PRP-114: *"Soil sampling would be needed at locations where groundwater sample results do not correlate well with soil gas sample results to determine whether there are any homeowner related spills" (Section 7, p. 11). Contaminants in soil gas tend to spread out through vapor dispersion, at best forming a halo around the source. If soil gas concentrations are related to "homeowner related spills" there is no real expectation that the spill would have to be at that exact location. If the soil gas was collected in the halo rather than the source, a corresponding soil sample would find nothing. The soil confirmation methodology recommended by EPA's contractor is unreliable and should be abandoned.*

EPA Response PRP-114: As indicated in Sections 2.9.3 and 2.11.1 of the ROD, the details of the final vapor monitoring program will be developed during the remedial design phase based on the results of pre-design investigations conducted to address the uncertainties identified in the 2003 Air Sampling Report. EPA is willing to consider other technically sound and appropriate approaches to confirm, as needed, whether soil gas concentrations are actually homeowner-related.

Comment PRP-115: *EPA's contractor states that "[q]uestions remain, however, such as whether past releases were in the form of dense non aqueous phase liquids (DNAPL). These may have resulted in very deep portions of the aquifer being contaminated, and shallower portions only exhibiting patterns of contamination consistent with that of residual contamination." (GDER Section 7, p. 8). EPA's contractor has recommended a very large and expensive investigation to address this "uncertainty" (GDER Section 7, p. 9). There is absolutely no evidence to suggest that DNAPL is a concern at this Site. There are a variety of methods available to environmental scientists to evaluate whether DNAPL is present at a site. The most common screening method used is a comparison of contaminant levels at locations downgradient of a suspected source to 1% of the analyte's solubility. If the concentration exceeds 1% of the solubility, then it is an indication that DNAPL might be present. Applying this rule to the site indicates that PCE would have to be in the groundwater at a minimum concentration of 2,000 ug/l instead of the 2002*

concentration of 5.9 ug/l; and TCE would have to be in the groundwater at a minimum concentration of 11,000 ug/l instead of the 2002 concentration of 7.2 ug/l. There is no evidence that would suggest the presence of DNAPL and the claims of EPA's contractor fly in the face of reputable and established environmental science.

EPA Response PRP-115: See EPA Response PRP-29. As indicated in Section 4.2.3 of the FS, Sections 2.9.3 and 2.11 of the ROD, and Section 7.2 in Appendix G of the ROD, the extent of the additional sampling and monitoring will be determined during the remedial design and will depend on the results of the pre-design investigations as well as the results of the long-term monitoring programs. The predesign investigations will ensure that the long-term monitoring is conducted in the appropriate locations and will generate greater confidence in the results and conclusions indicated by the data.

The Evergreen Manor groundwater contamination was not discovered until 1990. It is possible that groundwater samples collected at appropriate locations and intervals closer to the source(s) and closer to the unknown time(s) of the release(s) could have contained PCE and TCE at concentrations that would indicate a DNAPL. Many years later, this DNAPL could now be present much deeper in the aquifer, leaving only residual contaminant concentrations in shallower groundwater.

Comment PRP-116: *The contaminant concentrations found in groundwater are very low. The chemicals detected are used in common household products (e.g., paint and carpet stain remover). Small spills onto the ground could cause these concentrations. Small discharges to the septic system could cause these concentrations. It is likely that at least a portion of the concentrations detected in groundwater originate from residential sources.*

EPA Response PRP-116: See EPA Responses PRP-29 and PRP-112. As indicated in Section 4.2.3 of the FS, Sections 2.9.3 and 2.11 of the ROD, and Section 7.2 in Appendix G of the ROD, predesign investigations will be conducted to ensure that the long-term groundwater, residential well and vapor monitoring is appropriately conducted in appropriate locations. This will generate greater confidence in the results and conclusions indicated by the data.

Should EPA determine that a homeowner has a spill on his or her property, or has discharged the contaminants at issue to his or her septic system (other than the homeowner's past normal use of the contaminated groundwater), EPA will evaluate each situation on an individual, non-hypothetical basis in light of the applicable laws, regulations, and guidance, including but not limited to, applicable provisions of CERCLA, (including but not limited to the *de micromis* exception of Section 107(o), and the municipal solid waste exemption of Section 107(p)), the Brownsfield Liability Protection, and the July 3, 1991 guidance concerning EPA's "Policy Toward Owners of Residential Property at Superfund Sites." Under EPA's July 3, 1991 policy, "the Agency will continue to exercise its enforcement discretion and will not pursue an owner of residential property to undertake response actions or pay response costs," unless "the owner's activities lead to a release or threat of release of a hazardous substance resulting in the taking of a response action." Currently, EPA is not aware of any evidence that a homeowner spilled, or discharged to his or her septic system, any of the contaminants at issue.

Comment PRP-117: *EPA's contractor has recommended an extensive investigative program, the purpose of which to identify sources of contamination (e.g., septic*

systems) at residences (Section 7, pp. 11 12). The investigation will target 20% of homes (Section 7, p. 11).

EPA Response PRP-117: The Groundwater Data Evaluation Report does not target 20% of homes for septic investigations. Section 7, p. 12 states:

> *Based on the results of the soil gas and shallow groundwater characterization, it may be necessary to collect additional soil, soil gas and shallow groundwater samples in the vicinity of selected septic systems to determine whether the septic system is a source of contamination. However, it should also be noted that, prior to the municipal well hookup, household water obtained from contaminated private well supplies was discharged to septic systems.*

The FS estimated that septic characterization would be needed at 10 of approximately 300 homes in the area (see FS Section 4, p. 25 and Appendix F). As indicated in Section 4.2.3 of the FS, Sections 2.9.3 and 2.11 of the ROD, and Section 7.2 in Appendix G of the ROD, the extent of the additional sampling and monitoring will be determined during the remedial design and will depend on the results of the pre-design investigations as well as the results of the long-term monitoring programs. These investigations will ensure that the long-term monitoring is conducted in the appropriate locations and will generate greater confidence in the results and conclusions indicated by the data.

Comment PRP-118: *EPA's contractor concluded that, "data may not be sufficient to adequately determine the location and nature of the source(s). Thus, the source(s) of contamination, whether multiple sources, extraneous sources, point source or continuing source, remain unknown, and additional effort may be warranted to address this issue." (Section 6, pp. 3-4).*

EPA Response PRP-118: This comment concerns additional action to investigate and/or address the industrial sources of the groundwater contamination. As stated in Sections 1.5 and 2.8 of the ROD, records and sampling data indicate that the sources of the groundwater contamination have been addressed under state oversight and/or private actions and EPA does not believe that any further action is needed to investigate and/or address these sources areas at this time. However, as indicated in Section 2.11.1 of the ROD, a source area investigation is included as a contingency action.

Comment PRP-119: *With regard to source identification in the residential areas, EPA's contractor states, "[s]eptic systems, used by most, if not all of the Evergreen Manor subdivision residents, may be a point source of certain contamination (e.g., use of chemicals to unclog a drain)" (Section 7, pp. 11 12) and "contaminants that have not been characterized or quantified may be present... in the vadose zone in these [residential] areas," (Section 7, p. 9). EPA's contractor recommends an extensive investigation to locate these potential sources. (Section 7, p. 12). The additional work is directly contradictory with the conclusions of the RI, which states, "no further attempts at source identification are recommended." (RI Section 11, p. 7).*

EPA Response PRP-119: See EPA Responses PRP-26, PRP-98 and PRP-117. The purpose of the septic system investigations is, where needed, to confirm that a soil gas

problem is not site-related and does not require additional Superfund investigation, monitoring or remediation.

Comment PRP-120: *EPA's contractor admits "that the source(s) may not represent a continuing source of groundwater contamination" (Section 6, p. 3) and there is "an overall decreasing trend in chlorinated VOC concentrations over time" (Section 6, p. 3).*

EPA Response PRP-120: This comment concerns additional action to investigate and/or address the industrial sources of the groundwater contamination. See EPA Response PRP-118.

Comment PRP-121: *The evaluation of the No Action alternative resulted in an inappropriate rejection of all the evaluation criteria, and does not acknowledge the response actions taken to date. The development of the MNA alternative includes additional investigative tasks that are excessive in scope and unwarranted. Based on all the comments provided on the Proposed Plan and the various reports and plans, it is apparent that the development of alternatives should be modified. Moreover, it is apparent that a re-evaluation of existing alternatives is warranted based on a scientifically reliable evaluation of Site risks. The failure to include completed response actions in the No Action alternative, and the inclusion of unjustified investigative tasks in the MNA alternative indicate that the development of alternatives in the Proposed Plan is critically flawed. To address these issues, it is recommended that EPA re-evaluate the risk assessment and remedial alternatives with the inclusion of the following additional alternatives:*

Alternative 1B – No Additional Action. *This alternative would be identical to the existing No Action alternative except that the response actions which have already been completed at the Site (connection of residents to a municipal water supply and a local ordinance prohibiting groundwater use) would be appropriately recognized.*

Alternative 3B – Continued Monitoring. *This alternative would be identical to the existing MNA alternative except that monitoring would be limited to periodic sampling of existing well network consistent with most other MNA remedies selected by EPA.*

EPA Response PRP-121: EPA evaluated a No Action alternative in 4.2.1 and 4.3 in the FS and in Sections 2.9.1 and 2.10 of the ROD. EPA recognizes that some residents are connected to the municipal water supply and that Winnebago County ordinances require properties within 200 feet of a public water supply to connect to the public water supply instead of drilling a well. However, municipal water is not available in all areas of the site and more than 73 residences in the site area still obtain their water from private wells. VOC-contaminated groundwater is flowing beneath approximately 300 homes and additional sampling and monitoring is needed to ensure that potential risks from site-related vapors remain below acceptable levels. See Section 4.2.1 and 4.3 of the FS, Sections 2.9.1 and 2.10 of the ROD and EPA Responses PRP-1, PRP-17, PRP-18, PRP-29 and PRP-34 and PRP-105 for additional explanations as to why remedial action is needed at the Evergreen Manor site and why the No Action alternative would not protect human health and the environment. Also, because the No Action alternative does not include monitoring, EPA would not be able to verify that the No Action alternative complied with ARARs. Since the No Action alternative does not meet EPA's

threshold criteria of overall protection of human health and the environment and compliance with ARARs, EPA cannot select No Action as a remedy.

Concerning proposed Alternative 3B, monitored natural attenuation remedies are site-specific cleanup plans. These cleanup plans are designed to meet the remedial action objectives and data requirements for each site. The additional groundwater, residential well and vapor investigations conducted during predesign activities will be used to determine where additional long-term monitoring is necessary to ensure that the cleanup is progressing and that residents are not exposed to unacceptable levels of groundwater or vapor contaminants during the cleanup. See EPA Responses PRP-1, PRP-29, PRP-34 and PRP-105 for additional explanations as to why this monitoring is needed.

As indicated in Section 4.2.3 of the FS, Sections 2.9.3 and 2.11 of the ROD, and Section 7.2 in Appendix G of the ROD, the extent of the additional sampling and monitoring in EPA's MNA remedy will be determined during the remedial design and will depend on the results of the pre-design investigations as well as the results of the long-term monitoring programs. The predesign investigations will ensure that the long-term monitoring is conducted in the appropriate locations and will generate greater confidence in the results and conclusions indicated by the data.

Comment PRP-121 indicates that proposed Alternative 3B differs from EPA's MNA alternative only in that monitoring would be limited to periodic groundwater sampling at a limited number of existing wells. This indicates that like EPA's MNA alternative, proposed Alternative 3B would also include a predesign investigation, but with the expectation that long term residential well and vapor monitoring would not be required, and that only a limited number of existing groundwater monitoring wells would need to be periodically sampled.

Based on the predesign investigation in EPA's MNA remedy, EPA may determine that residential well and vapor monitoring is not warranted and that groundwater monitoring is only needed at a limited number of existing groundwater monitoring wells consistent with proposed Alternative 3B. Because EPA's MNA remedy does not preclude a limited monitoring program at existing wells consistent with proposed Alternative 3B, additional evaluation of proposed Alternative 3B is not required.

Comment PRP-122: *The data shows that EPA's course of action adopted following its October 1998 EE/CA successfully addressed the potential risk posed by then-detected groundwater contamination. Due to the appropriate response action taken – namely replacement of private water supply wells with municipal water – there is no reasonable concern that the site poses a risk of harm. EPA is to be congratulated on implementing an appropriate response strategy that eliminated the exposure pathway of concern and circumvented the delays associated with the Superfund remedial action program. The investigative data compiled subsequent to the EE/CA confirm that the groundwater contamination has declined to below the MCLs for the constituents of concern in the residential areas of the (now former) plume. The two exceedences of the MCLs detected during the April 2002 sampling included one detection in the industrial park area, and one that is an estimated, not quantified value. Regardless, the detected contamination at these two wells is projected to soon fall below the MCLs as well.*

As a result, the site now poses no unacceptable risk. Not only has the groundwater exposure pathway been eliminated, there simply is no risk via vapor pathways. EPA's

contractor admits that there is no correlation between the "plume" and soil vapor samples. And, soil vapor samples taken from above where the "plume" used to be are below significant levels. The only soil vapor detections at levels of concern were in areas outside the plume. Also, since the groundwater quality beneath the residences has improved to at or below MCLs, there is no further action needed for vapor sampling – as per EPA's latest guidance.

Therefore, a true monitored natural attenuation remedy – not the $8.5 million research project proposed – is supported by the data and existing institutional controls. This is the appropriate course of action for two reasons: (1) the constituents of concern meet, or shortly will meet, the MCLs; and (2) there is no evidence of risk to human health or the environment. The recent data, as discussed below, fully support the conclusion that the site presents no substantial endangerment because there is no exposure pathway that presents a substantial likelihood that contaminants will be ingested or inhaled; and the contaminant concentrations (even assuming ingestion or inhalation) do not lead to a substantial statistical probability that disease will result. There simply is no threat of serious harm presented by the residual groundwater contamination.

EPA Response PRP-122: See EPA Responses PRP-1, PRP-29, PRP-34, PRP-41, PRP-96, and PRP-105. EPA's Bioscreen groundwater modeling indicates that PCE concentrations may not decrease below MCLs until 2015 (see RI Section 8.4).

Comment PRP-123: *EPA's preferred $8.5 million alternative is unjustified and beyond extravagant in light of the extensive data already gathered regarding all aspects of the site and the contamination. The bottom line is that, with the April 2002 data collection, only two exceedences of the MCLs for TCE and PCE (5 ppb) are identified: (1) MW-103S at 5.9 ppb PCE, which is estimated to decline to below the MCL in approximately three years (mid-2005), and is located almost one mile from the nearest residence at Evergreen Manor and about two miles from MW-03 and (2) MW-03 at 7.2J ppb TCE, which (assuming an actual and not estimated concentration) is estimated to decline to below the MCL in approximately one and a half years (late 2003). Notably, MW-03 was installed in the "most apparent zone of contamination" based on the 2000 RI investigation. GD §C.4, p.7.*

EPA Response PRP-123: See EPA Responses PRP-1, PRP-29, PRP-41, PRP-96, and PRP-105. EPA's Bioscreen groundwater modeling indicates that PCE concentrations may not decrease to below the MCL until 2015 (see Section 8.4 in RI).

Comment PRP-124: *EPA rejects the "No Action" alternative and does not propose an alternative that consists of minimal additional monitoring of the natural attenuation remedy previously selected by EPA with the 1998 EE/CA (and 1999 AOC). Furthermore Weston offers no rational explanation for why the EPA should deviate from the course of action recommended by the 1998 EE/CA. The rejection of the "No Action" alternative is justified with the nonsensical statement that it "does not offer long-term effectiveness and permanence because no remedial action is implemented." FS §4.3.3, p.42. Monitored natural attenuation (MNA) is a remedial action – one that has been recognized as operational and effective at this site for over five years! The real flaw with EPA's proposed alternatives is that a true monitored natural attenuation alternative is not included.*

EPA Response PRP-124: EPA rejected the No Action alternative because the No Action alternative does not meet the threshold requirement for overall protection of

human health and the environment. Because the No Action alternative does not include monitoring, EPA would also not be able to verify that the No Action alternative complied with ARARs. See Section 4.2.1.2 in the FS and Sections 2.9.1 and 2.10 in the ROD. See also EPA Responses PRP-29, PRP-34, PRP-41, PRP-98 and PRP-105.

Comment PRP-125: *The flawed FS alternatives also ignore the institutional controls already implemented by Winnebago County. Instead, EPA employs some slight of hand by defining the current "plume" by the extent of VOCs detections rather than the extent of MCLs exceedences and then comparing the area of the detections "plume" to the residential and commercial entities in the "vicinity" that are not, for whatever reason, connected to the municipal water supply. All this while at the same time unequivocally agreeing that the constituents of concern (PCE and TCE) are declining or stable throughout the extent of the original plume of contamination.*

EPA Response PRP-125: See EPA Responses PRP-29, PRP-34, PRP-105. It is technically accurate and appropriate to define the extent of groundwater contamination by the first line of non-detect samples. However, at some sites, the extent of groundwater contamination may be defined by MCLs or other criteria. Based on the limited horizontal and vertical groundwater sampling points available across the 2-mile Evergreen Manor plume and considering vapor intrusion concerns (see EPA Responses PRP-29 and PRP-58), EPA does not agree that it would be appropriate to define the extent of the Evergreen Manor plume by MCL exceedences. While EPA agrees that available same-location sampling indicates that PCE and TCE concentrations are declining, EPA also recognizes the uncertainties at the site (EPA Response PRP-29).

Comment PRP-126: *EPA completely ignores the fact that the recent groundwater water quality data suggests that the plume is bifurcating. This is evidence that the sources have been adequately mitigated and are no longer contributing contaminants to the groundwater, and that the plume is steadily and progressively attenuating.*

EPA Response PRP-126: See EPA Response PRP-118 concerning additional actions to investigate/address the industrial sources of the groundwater contamination. While EPA agrees that available same-location sampling indicates that PCE and TCE concentrations are declining (given the uncertainties at the site), EPA is not certain what data Comment PRP-126 is referring to that suggests that the plume is bifurcating.

Comment PRP-127: *All of the risk assessment data, calculations and conclusions discussed in the FS result in the same conclusion. The site does not pose any unacceptable risk, period. This is true even though the 2001 risk assessment assumed an ingestion pathway for groundwater despite the extension of municipal water, which was completed in September 2000.*

EPA Response PRP-127: See EPA Responses PRP-1, PRP-2, PRP-3, PRP-29, PRP-34 and PRP-105. The Evergreen Manor ROD is based on the RI, the Air Sampling Report, the Groundwater Data Evaluation Report, the FS and the other documents in the Administrative Record.

Comment PRP-128: *Perhaps recognizing the disconnect between the risk assessment results and the $8.5 million investigation junket proposed in the selective alternative, EPA stated at the August 19, 2003, public meeting and information availability session that it had "revised" the risk numbers, and now the risk was in the unacceptable range.*

As discussed below in the detailed comments, and in the comments submitted on behalf of Ecolab, the risk assessment is highly flawed and inaccurate. To now rely upon a very flawed risk assessment as a basis for justifying an extravagant investigation is both a disservice to EPA and the residents of Roscoe and an inappropriate use of limited Fund resources. When the risk numbers are calculated using correct data and appropriate methods (including the elimination of boot-strapped "site-related" ubiquitous petroleum compounds), the inescapable conclusion is that the risk numbers are well within the acceptable range and the site poses no risk to human health or the environment.

EPA Response PRP-128: EPA updated the risk assessment using updated and more conservative cancer toxicity factors recommended by EPA's Superfund Health Assessment Technical Support Center and OSWER (see EPA Responses PRP-4 and PRP-5). The updated risk assessment used the same methods, exposure pathways and parameters in the EPA-approved 2001 risk assessment and EPA disagrees that either risk assessment is flawed or inaccurate (see previous EPA PRP Responses including EPA Responses PRP-2, PRP-3, PRP-43 to PRP-57 and PRP-87 to PRP-96).

EPA considers petroleum-related compounds such as benzene, toluene and xylene to be site-related because these chemicals were detected in soil samples collected from the former AAA Disposal property. Benzene was found as high as 1,000 ug/kg, toluene was found as high as 940 ug/kg, and xylene was found as high as 7,300 ug/kg. See Section 2.2.1 of ROD.

Comment PRP-129: *If EPA were to apply the Hazard Ranking System using the most recent data, the site would not score high enough to be considered for inclusion on the National Priority List and would meet the CERCLA "no further action" or NFA criteria.*

EPA Response PRP-129: The site was scored and is proposed for the NPL. Based on the conclusions and recommendations in the Air Sampling Report and the Groundwater Data Evaluation Report, EPA disagrees that this site would meet the NFA criteria.

Comment PRP-130: *In the early 1990s, TCE concentrations detected in residential and monitoring wells at Evergreen Manor exceeded the MCLs. FS Fig. 5-3. As illustrated by FS Figure 1-10, TCE concentrations are declining or stable and the plume is shrinking (FS Table 5-5). Natural attenuation is occurring with all contaminants declining to below standards in all but two instances. One (MW-03 at 7.2J ppb TCE) is an estimated, not quantified, value and is, nonetheless, estimated to be below the MCL as of late 2003 (i.e., now). The other (MW-103S at 5.9 ppb PCE) is estimated to be below the MCL by mid-2005 and is also almost a mile from the nearest residence at Evergreen Manor. See FS Table 5-5, GD §C.4, p. 7. This meets the criteria for using natural attenuation as the selected alternative, and shows groundwater is of no risk to receptors (even assuming someone could ingest the groundwater now). {FS §1.5.2, p.29 ¶3}*

EPA Response PRP-130: EPA agrees that natural attenuation is occurring. See EPA Responses PRP-1, PRP-29, PRP-34 and PRP-105. EPA's Bioscreen groundwater modeling indicates that PCE may not reach MCLs until 2015, not 2005. See Section 8.4 and Appendix F of the RI and Section 5.5.1 of the Groundwater Data Evaluation Report.

Comment PRP-131: *Waste Management strongly agrees that all evidence of shrinking plume and daughter products detected support the conclusion biodegradation is occurring. FS §1.5.2, p.31 ¶2. The evidence of natural attenuation combined with the evidence that the constituents of concern meet, or soon will meet, the MCLs justifies a "No Action" response, or at most, some limited additional monitoring for a period of time to provide further verification of the effectiveness of the natural attenuation remedy. For example, as a regional comparison, the SE Rockford study area is three square miles and the agency is only requiring an additional nine monitoring wells to verify the downward trends in historical data to support natural attenuation.*

EPA Response PRP-131: See EPA Response PRP-41. EPA's Bioscreen groundwater modeling indicates that PCE may not attain MCLs until 2015 (RI Section 8.4).

Comment PRP-132: *There is simply no evidence of DNAPL and additional DNAPL investigation is not justified. {FS §1.5.4, p.33} None of the conditions to support DNAPL as a suspected source exist historically or presently in the northeast industrial area of the Evergreen Manor study area according to EPA guidance and the scientific literature. According to Feenstra, et al. (1991), soil chemistry indicative of DNAPL would be in the thousands of ppm rather than the very low ppb results found in the alleged source areas. According to EPA's Guidance on DNAPL Site Evaluation (EPA/R-93-022) groundwater typically shows concentrations in presence of DNAPL of 1 to 100 ppm (or 1 to 10% of a VOC's solubility) instead of the low ppb levels seen in the study area presently and historically. Also there would be visible staining of DNAPL from droplets within the pore space of the soil samples, very high soil vapor concentrations in the ppm range, and a much more steady concentration over time than has been observed at the site. See also Evaluation of Likelihood of DNAPL Presence at NPL Sites, National Results (EPA/R-93-073 September 1993). An evaluation of the Warner Electric data shows these types of concentrations in groundwater (in the ppm range) and their source was mostly in the form of dissolved solvent in the wastewater treatment pond, apparently due to their use of solvent products within the plant. If DNAPL has not been found in the Warner Electric plume, then there exists no evidence to even remotely suggest that it would exist in the Evergreen Manor plume or source area.*

EPA Response PRP-132: See EPA Response PRP-115. Comment PRP-132 did not describe the specific DNAPL investigations that were undertaken at the Warner Electric Site that led to the conclusion that DNAPL was not present at that site or whether or not the same quantity and chemical composition of wastes were disposed of in the same manner at both sites.

Comment PRP-133: *Additional depth specific sampling near the industrial park is not needed as stated at FS §1.5.5, p.36 •2. This was already undertaken, especially near Waste Management's former transfer station, with CPT11 which showed no significant detections of the constituents of concern. Also, depth specific sampling with CPT was conducted along McCurry Road and no constituents of concern were found. Any additional investigative work in this vein would be redundant, irrelevant and wasteful of Fund resources since no constituents of concern were found shallow or deep in these locations.*

EPA Response PRP-133: See EPA Responses PRP-29, PRP-41 and PRP-105. While significant VOC contamination was not found during CPT-11 sampling near the suspected source area, virtually no specific information is known about the

characteristics of the source area. The exact location(s) are not known. The quantity of source material released is not known. The mechanism(s) of release(s) are not known. The PRPs have also not been able to shed any light on this. Given these facts, it is very possible that the location of CPT-11 was also not properly located with respect to what could be a very widespread source area with multiple release points. To say the least, depth-specific sampling efforts in the source area have been extremely limited thus far in light of the fact that chlorinated solvent constituents are still present in the suspected source area at levels above regulatory criteria (e.g., MW-103). Although concentrations have decreased, these still represent the highest PCE levels detected over time at the site. While not detected in CPT-11 or CPT-12, both TCE and PCE continue to be detected in fixed monitoring wells on the west side of Route 251, suggesting either a more southwesterly migration route (where virtually no data exists) or possibly sampling method biases since when comparing fixed monitoring point data collected using low-flow sampling methodology to that of grab sampling methods (CPT) where the opportunity for volatilization increases during the sampling process. Additionally, although Comment PRP-133 contends that CPT sampling along McCurry Road indicated no constituents of concern detected, CPT-10 samples showed the presence of PCE and 1,1,-DCA at levels slightly lower, but comparable to those found in fixed monitoring well points just to the south along Matthews Road. This indicates that chemical constituent stratification is present within the upper 100 feet of the aquifer and no work has been conducted to characterize the extent of potential deeper stratification. Documentation of source area vertical contaminant characteristics (as well as other areas) remains a significant data gap at the site which must be addressed in order to assure that the MNA remedy is properly implemented and will be protective.

Comment PRP-134: *There is no vapor migration pathway that is correlated with prior groundwater contamination. {FS §1.5.4, p.33} The prior groundwater contamination was too low to contribute to soil gas. None of the soil gas concentrations above the plume show significant detections, which demonstrates a lack of correlation between groundwater contamination and soil gas results. {FS §1.5.2, p.23} The highest PCE and TCE concentrations in soil gas have no connection with groundwater contamination. {FS §1.5.4, p.35 •2} The FS states that contaminants may be at the water table surface. This would have to be due to a spill at the homeowner's area – see FS §1.5.5, p.37 •2. A vapor study at Evergreen Manor is unnecessary due to the extremely low detections of VOCs. The mass of VOC at the water table, available for vapor diffusion into the soil column, is very low. A plume moving from a source that is two miles upgradient would attenuate from the water table down – the concentrations of VOCs at the water table will decrease as a function of distance from the source, because of the diluting effects of recharge and infiltration. It is very likely that what minimal VOCs exist at the water table are from local sources such as septic fields. Study of septic fields would arguably implicate the residents in the area as contributors to the contamination as EPA has documented usage of VOC-containing household products in the Evergreen Manor area.*

EPA Response PRP-134: See EPA Responses PRP-29 and PRP-106. While EPA has documented that some of the residents in the Evergreen Manor site store VOC-containing household products in their homes and/or garages, EPA has no documentation that these residents dispose these products down their drains or into their septic systems. However, prior to the 1999-2000 municipal well hookup, household water obtained from contaminated groundwater drawn from the Evergreen Manor site plume was discharged into septic systems.

Comment PRP-135: *Investigation of septic systems in the study area, as set forth at FS §1.5.5, p.37 •3 and GD §7.2.2, p. 11 •3, is unnecessary if the objective is to filter out background impacts relative to the alleged vapor intrusion pathway. EPA has studies that show VOCs are commonly used in septic tank maintenance chemicals. Any prior contamination from household water discharged to the septic systems would not result in high enough levels to cause soil vapor contamination due to the anaerobic digestion of a septic system, which would be a good environment to dechlorinate and biodegrade the constituents of concern completely or to much lower levels than observed in historic groundwater data.*

EPA Response PRP-135: EPA is willing to consider any site-specific data this commenter has to support the statements made in Comment PRP-135. The selected remedy for the Evergreen Manor site is a site-specific cleanup plan designed to meet the remedial action objectives and data requirements of this site. The additional groundwater, residential well and vapor investigations conducted during predesign will be used to determine where additional long-term monitoring is necessary to ensure that the cleanup is progressing and that residents are not exposed to unacceptable levels of groundwater or vapor contaminants during the cleanup. See EPA Responses PRP-1, PRP-26, PRP-29 and PRP-34 for additional explanations as to why this monitoring is needed. As indicated in Section 4.2.3 of the FS, Sections 2.9.3 and 2.11 of the ROD, and Section 7.2 in Appendix G of the ROD, the extent of the additional sampling and monitoring will be determined during the remedial design and will depend on the results of the pre-design investigations as well as the results of the long-term monitoring programs. The predesign investigations will ensure that the long-term groundwater, residential well and vapor monitoring is conducted in the appropriate locations and will generate greater confidence in the results and conclusions indicated by the data.

Comment PRP-136: *It has previously been stated that there was no evidence of prior or existing surface water or sediment contamination. These concentrations have since declined to below drinking water standards. Based on the current groundwater quality, there is no future concern about the surface water pathway. {FS §2.1.1.1, p.8}*

EPA Response PRP-136: As indicated in Sections 2.8 and 2.11.1 and 2.11.3 of the ROD, EPA's selected remedy includes monitoring and, if necessary, contingencies (e.g., ecological risk evaluation, contaminant fate and transport modeling and surface water and/or sediment sampling) to verify that the Rock River is not impacted by groundwater contaminants discharging to the river.

Comment PRP-137: *While at the same time stating that there is no reduction of present and future risks at the site, the FS concludes the remedy (natural attenuation) "is effective in the short-term as the site does not pose an imminent threat to human health of the environment." The model used and kinetics shown in the FS also show a future continuing decline in VOCs. This obviously shows that natural attenuation is also effective in the long term. The No Action alternative, or a true monitored natural attenuation alternative, is therefore effective in both the short and long term and is a valid alternative. {FS §3.3.1, p.7}*

EPA Response PRP-137: Section 3, p. 7 of the FS concerns the No Action alternative and is a "Preliminary Screening of Alternatives. See EPA Response PRP-35. A no-action alternative is not the same as a monitored natural attenuation alternative. See the full discussions for these alternatives in Sections 4.2.1 and 4.2.3 of the FS and Sections 2.9.1, 2.9.3 and 2.10 of the ROD.

Comment PRP-138: *Contrary to the statement at FS §4.2.1.2, p.9, there are institutional controls to prevent people from using groundwater. As noted elsewhere in the FS, Winnebago County has put institutional controls in place. See FS §4.2.1.2, p.12. The limited resources of the Fund would be better spent working with Winnebago County to enforce the ordinance and encourage those residences in the area that still have wells, if any, to abandon them.*

EPA Response PRP-138: While Winnebago County Code Article III Section 86-111 requires properties within 200 feet of a public water supply to connect to the water supply instead of drilling a well, not all areas of the site are serviced by municipal water (ROD Figure 8). In areas where municipal water is not available and where it is uncertain whether groundwater contaminants are still above drinking water levels (e.g., the 1-mile tract of farmland north of the residential areas), EPA and Winnebago County will work together to discourage (but without the authority to prevent) groundwater use, and will sample new wells and, if necessary, implement contingency actions to ensure that residents are not exposed to unacceptable levels of contaminants.

Comment PRP-139: *The additional investigation and monitoring costs proposed at FS §4.2.3.2, p.39, are extremely high, particularly in light of the large amount of data already available for the site. The additional shallow groundwater monitoring is not justified, especially since there is no exposure pathway by groundwater. The very shallow groundwater that is desired to be monitored separately also has been shown to be clean from the CPT results. Remedial Investigation (RI), March 2001. The site can be adequately monitored with existing sample points, especially since there are no groundwater exposure pathways.*

EPA Response PRP-139: See EPA Responses PRP-1, PRP-29 and PRP-105. The selected remedy for the Evergreen Manor site is designed to meet the remedial action objectives and data requirements of this site. The additional groundwater, residential well and vapor investigations conducted during predesign will be used to determine where additional long-term monitoring is necessary to ensure that the cleanup is progressing and that residents are not exposed to unacceptable levels of groundwater or vapor contaminants during the cleanup. See EPA Responses PRP-1, PRP-26, PRP-29 and PRP-34 for additional explanations as to why this monitoring is needed. As indicated in Section 4.2.3 of the FS, Sections 2.9.3 and 2.11 of the ROD, and Section 7.2 in Appendix G of the ROD, the extent of the additional sampling and monitoring will be determined during the remedial design and will depend on the results of the pre-design investigations as well as the results of the long-term monitoring programs. The predesign investigations will ensure that the long-term groundwater, residential well and vapor monitoring is conducted in the appropriate locations and will generate greater confidence in the results and conclusions indicated by the data.

Comment PRP-140: *Concern is expressed at GD §6.4, p.8, about sharp difference in TCE concentrations at two adjacent residences and concerns about actual groundwater trends. This is irrelevant since there is no longer an exposure pathway from groundwater to the residences. The overall trend at wells historically sampled and for newly sampled CPT every 8 feet in depth show very low contaminants and no trend in CPT data as to whether VOCs are shallow or deep. If VOCs are found in CPT data, they appear to be evenly dispersed from shallow to deep, but below MCLs. See RI, March 2001.*

EPA Response PRP-140: This issue is not irrelevant as it supports EPA's concerns that the existing groundwater monitoring well network and CPT locations may not be appropriately located to characterize site contamination. See also EPA Responses PRP-29 and PRP-105.

Comment PRP-141: *Waste Management agrees with the statement at GD §6.6, p.15, concluding that there are no currently active source areas. The lack of an ongoing source conflicts with the FS' inappropriate failure to include a true monitored natural attenuation alternative on the basis of uncertainty of the sources.*

EPA Response PRP-141: See EPA Response PRP-139.

Comment PRP-142: *It is recommended at GD §7.2.2, p. 11, that 50 soil gas and shallow groundwater samples be collected within Evergreen Manor and that 25 homes be targeted for long-term vapor monitoring. This is a "shot gun" approach and no rationale can be provided for such intensified sampling. If groundwater quality is below MCLs, there is no exposure path via ingestion or vapor intrusion. Trends have been consistently downward and even predicted in the models. CPT data do not indicate a tendency for shallow groundwater to have greater concentrations than intermediate or deeper depths. In the SE Rockford study, residences only were sampled when groundwater and soil vapor were at very high levels (well above MCLs) and the residences were adjacent to the sources (industries). At the Acme Solvent Reclaiming study area, homes were deemed of no risk to air pathways since they were more than 1/4 mile from the source – a much shorter distance that the one to two miles for Evergreen Manor. The groundwater contamination concentrations are very low at the alleged sources for Evergreen Manor and no MCL exceedences were detected at or near the water table. Further, no vapor was found above levels of concern in samples taken in 1992 (when, in some monitoring wells, VOCs were above MCLs). Therefore the logic of the proposed residential vapor sampling is not consistent with actions taken at existing NPL sites in the region.*

EPA Response PRP-142: Based on the number of homes (300) and size of the residential area, EPA estimated that 50 shallow groundwater and soil gas samples would provide adequate spatial coverage throughout the area to characterize shallow groundwater and soil gas contamination. See EPA Responses PRP-29 and 105. The selected remedy for the Evergreen Manor site is designed to meet the remedial action objectives and data requirements of this site. The additional groundwater, residential well and vapor investigations conducted during predesign will be used to determine where additional long-term monitoring is necessary to ensure that the cleanup is progressing and that residents are not exposed to unacceptable levels of groundwater or vapor contaminants during the cleanup. See EPA Responses PRP-1, PRP-26, PRP-29 and PRP-34 for additional explanations as to why this monitoring is needed. As indicated in Section 4.2.3 of the FS, Sections 2.9.3 and 2.11 of the ROD, and Section 7.2 in Appendix G of the ROD, the extent of the additional sampling and monitoring will be determined during the remedial design and will depend on the results of the pre-design investigations as well as the results of the long-term monitoring programs. The predesign investigations will ensure that the long-term groundwater, residential well and vapor monitoring is conducted in the appropriate locations and will generate greater confidence in the results and conclusions indicated by the data.

IEPA's limited soil gas sampling in 1992 was an attempt to trace the groundwater contamination back to its sources. This soil gas sampling did not have the same data

quality objectives and quality control requirements that would be required for soil gas sampling undertaken to assist in identifying areas of potential risk.

Comment PRP-143: *It is recommended at GD §7.2.2, p.11 •2, that soil sampling be conducted to determine if there are homeowner-related spills. How would such spills be determined and what would the result be? Groundwater quality already does not correlate well with any of the past and recent soil gas data. None of the soil gas data has been shown to be useful in this project except to show that there is no problem or issue with DNAPL. Would the homeowners be considered PRPs for the site and responsible for the sampling costs incurred?*

EPA Response PRP-143: See EPA Responses PRP-29, PRP-105, PRP-106, PRP-114 and PRP-115. Section 7.2.2, p. 11 of the Groundwater Data Evaluation Report discusses what actions EPA may take, should EPA find evidence of the scenario where soil gas samples show levels of chemical vapors that do not correlate to the contamination in the groundwater below that sampling location. Should this occur, EPA will conduct further analysis to determine whether the results indicate a collection or a channel point for groundwater vapors, or a possible small, unrelated spill.

Should EPA determine that a homeowner has a spill on his or her property, EPA will evaluate each situation on an individual, non-hypothetical basis in light of the applicable laws, regulations, and guidance, including but not limited to, applicable provisions of CERCLA, (including but not limited to the *de micromis* exception of Section 107(o)), the Brownsfield Liability Protection, and the July 3, 1991 guidance concerning EPA's "Policy Toward Owners of Residential Property at Superfund Sites." Under EPA's July 3, 1991 policy, "the Agency will continue to exercise its enforcement discretion and will not pursue an owner of residential property to undertake response actions or pay response costs," unless "the owner's activities lead to a release or threat of release of a hazardous substance resulting in the taking of a response action." Currently, EPA is not aware of any evidence that a homeowner spilled any of the contaminants at issue.

Comment PRP-144: *Why is it assumed that residents use on-site groundwater when municipal water lines were extended between September 1999 and September 2000? {FS §2.1.1.1, p.4 ¶3} Had Waste Management known in 1998 that the EPA's contractor would persist with this illogical line of reasoning its contribution to the installation of the municipal water system would have been under different terms. At best this is an example of circular logic. At worst it is a demonstration of bad faith or incompetence on the part of Weston.*

EPA Response PRP-144: More than 73 residences in the site area still obtain their water from private wells, and municipal water is only available in certain areas (see ROD Figures 7 and 8). Because the current horizontal and vertical extent of the Evergreen Manor groundwater contamination is somewhat uncertain, EPA's selected remedy is needed to verify that private wells are not impacted above acceptable levels and that new well users in areas where municipal water is not available (and where new wells will be permitted) will not be exposed to unacceptable levels of contaminants.

Comment PRP-145: *VOCs detected in indoor air samples within the extent of the historic groundwater contamination plume are no higher than the concentrations found in the average urban American home and can be attributed to common household products. At the SE Rockford site, EPA concluded the VOCs detected in residential basements over a VOC-contaminated groundwater source were from common*

household products and were no higher than the concentrations found in the average urban American home. Illinois Environmental Protection Agency, Fact Sheet, Source Area 7, Southeast Rockford Groundwater Contamination Superfund Project (February 1995). Notably, at SE Rockford, the VOCs in the groundwater were much higher in concentration than for the Evergreen Manor plume. The groundwater concentrations at SE Rockford and Acme Solvent Reclaiming were up 400 to 970 ppm for chlorinated solvents. These are concentrations over four orders of magnitude higher than the historical high concentrations found anywhere at the Evergreen Manor study area. Additionally, at the nearby Warner Electric site, indoor air quality samples are being taken only in those portions of the plume where groundwater contamination concentrations at the water table exceed threshold criteria. And, at that, the approved investigation at the Warner Electric site is a phased, reasonable and representative approach. In contrast, at the Evergreen Manor site, the threshold criteria are not exceeded in the areas where EPA proposes to conduct indoor air quality sampling.

EPA Response PRP-145: See EPA Responses PRP-8, PRP-29, PRP-58, PRP-105 and PRP-112. EPA is willing to consider an appropriate phased approach for conducting the vapor investigation during the remedial design.

Comment PRP-146: *The FS inappropriately goes from the "No Action" alternative to an extravagant $8.5 million supposed monitored natural attenuation remedy. It fails to include a true monitored natural attenuation alternative that has an appropriate monitoring scope. The "No Action" alternative was rejected on the basis it would not be effective in protecting human health and the environment or reducing the toxicity, mobility, or volume of the contaminants of concern within various environmental media at the site. The only evidence cited for this asserted lack of effectiveness is the detection of VOCs vapors in a few homes. However, there are no soil vapor detections near the homes that had VOCs detects in the indoor air samples. The groundwater meets health-based standards and there is no exposure pathway to the residences. {FS §3.3.1, p.7}.*

EPA Response PRP-146: See EPA PRP Responses PRP-29, PRP-105 and PRP-144. The selected remedy for the Evergreen Manor site is designed to meet the remedial action objectives and data requirements of this site. The additional groundwater, residential well and vapor investigations conducted during predesign will be used to determine where additional long-term monitoring is necessary to ensure that the cleanup is progressing and that residents are not exposed to unacceptable levels of groundwater or vapor contaminants during the cleanup. See EPA Responses PRP-1, PRP-26, PRP-29 and PRP-34 for additional explanations as to why this monitoring is needed. As indicated in Section 4.2.3 of the FS, Sections 2.9.3 and 2.11 of the ROD, and Section 7.2 in Appendix G of the ROD, the extent of the additional sampling and monitoring will be determined during the remedial design and will depend on the results of the pre-design investigations as well as the results of the long-term monitoring programs. The predesign investigations will ensure that the long-term groundwater, residential well and vapor monitoring is conducted in the appropriate locations and will generate greater confidence in the results and conclusions indicated by the data.

Section 3.3.1 of the FS is a preliminary screening of the No Action alternative. See the full discussion for this alternative in Section 4.2.1 of the FS and Sections 2.9.1 and 2.10 of the ROD.

Comment PRP-147: *The risk assessment is flawed because it assumes an exposure pathway that no longer exists. {Risk Assessment (RA) §9.3}.*

Comment PRP-147: See EPA Response PRP-1 and PRP-98.

Comment PRP-148: *The risk assessment is flawed, even assuming the pathway still exists, because it used the unsupported draft revised cancer slope factors for PCE and TCE. In the absence of a final approved slope factor for PCE, the value recommended by the EPA National Center for Exposure Assessment should be used. The draft, unsubstantiated value used in the revised risk calculations should not have been used for quantitatively estimating site risks. The draft slope factor for TCE has, unlike PCE, been released for public review – and found wanting. EPA's Science Advisory Board sent the proposed draft back for further revisions due to problems with the underlying science used in its development. EPA Region 8 has rejected the proposed draft. It was inappropriate for EPA to rely upon these draft slope factors to determine the recently recalculated risk numbers.*

EPA Response PRP-148: See EPA Responses PRP-4 and PRP-5.

Comment PRP-149: *The risk assessment is flawed because it included ubiquitous household compounds that are not groundwater constituents of concern. EPA incorrectly assumed that most of the chemicals detected in the indoor air samples were present due to residual groundwater compounds, without considering their prevalent use and presence in household products and materials such as paint, cleansers, gasoline, construction materials, etc. The Air Sampling study measured these background indoor air constituents without acknowledging they were background. Collecting additional indoor air samples would serve no further purpose and would merely confirm that the levels detected in site homes are entirely consistent with other homes throughout the country.*

EPA Response PRP-149: See EPA Responses PRP-8, PRP-31, PRP-105.

Comment PRP-150: *The FS is flawed because it is founded on a combination of faulty and overly conservative assumptions as described above and in CRA's comments on behalf of Ecolab. Had the alternatives discussed in the FS been tied into a valid risk or exposure method, a true monitored natural attenuation alternative or "No Action" would have been the obvious alternative.*

EPA Response PRP-150: See EPA Responses PRP-1, PRP-2, PRP-3, PRP-33 to PRP-41, PRP-43 to 57 and PRP-121.

Comment PRP-151: *As the last data collection effort occurred in April 2002, there is no justifiable explanation for the fact that the FS and related reports contradict EPA's statements at the February 18, 2003, public meeting that "No Action" was the recommended course of action.*

EPA Response PRP-151: EPA did not recommend a course of "No Action" at the February 18, 2003 public meeting. EPA did state that the 2002 soil gas and air sampling data indicated that venting systems were necessary. EPA's overheads and presentation at the February 2003 meeting were consistent with EPA's February 2003 Air Sampling Fact Sheet which clearly indicates (p.1 and 3):

More testing must be done, however. Air and soil samples were taken at only four homes and many factors can affect the results. EPA also needs to collect more groundwater samples to see if some of the chemicals detected in the homes are really coming from the groundwater....EPA will propose the additional air and soil sampling in an upcoming document called a proposed plan. EPA's proposal will include groundwater sampling and air and soil sampling at more homes at different times of the year.

EPA's statements during the public meeting and in its Fact Sheet are clearly consistent with EPA's 2003 Proposed Plan.

Comment PRP-152: *Waste Management appreciates EPA's courtesies in providing information and allowing additional time for Waste Management to complete its comments. Waste Management urges EPA to carefully consider these comments. Waste Management strongly believes it would be imprudent to waste precious Fund resources to further investigate a site that no longer presents an unacceptable risk. And the Agency should not assume that Waste Management will be willing to contribute to further investigation of this site based on the biased and gerrymandered risk analysis presented by EPA.*

EPA did the right thing in 1999 in negotiating the AOC for funding the extension of municipal water to residents within (and beyond) the groundwater contamination plume. Waste Management and the other AOC parties funded that water extension – despite strong evidence to dispute any liability for the site – because they recognized that the best thing to do was to eliminate the exposure pathway. By keeping contaminated groundwater out of people's homes – no matter what the source of the original contamination – EPA eliminated the risk posed by the VOCs contamination in the aquifer.

The most appropriate and cost-effective remedy long and short-term is limited additional monitoring to confirm the continued effectiveness of natural attenuation. Specifically, the most reasonable, cost-effective and protective alternative would be limited annual monitoring at a select number of wells to document further declining trends.

EPA Response PRP-152: EPA does not agree with Waste Management's conclusions that the site does not pose an unacceptable risk or that the risk assessment is biased and gerrymandered. More than 73 private wells are still in use in the site area, and municipal water is only available in certain areas. Because the current horizontal and vertical extent of the Evergreen Manor groundwater contamination is somewhat uncertain, EPA's selected remedy is needed to verify that private wells are not impacted above acceptable levels and that new well users in areas where municipal water is not available (and where new wells will be permitted) will not be exposed to unacceptable levels of contaminants. VOC-contaminated groundwater is flowing beneath approximately 300 homes and additional vapor investigations and monitoring as needed is necessary to ensure that potential risks from site-related vapors remain below acceptable levels.

Monitored natural attenuation remedies are site-specific cleanup plans designed to meet the remedial action objectives and data requirements for each site. The additional groundwater, residential well and vapor investigations conducted during the Evergreen Manor predesign investigation will be used to determine where additional long-term

monitoring is necessary to ensure that the cleanup is progressing and that residents are not exposed to unacceptable levels of groundwater or vapor contaminants during the cleanup. As indicated in Section 4.2.3 of the FS, Sections 2.9.3 and 2.11 of the ROD, and Section 7.2 in Appendix G of the ROD, the extent of the additional sampling and monitoring in EPA's MNA remedy will be determined during the remedial design and will depend on the results of the pre-design investigations as well as the results of the long-term monitoring programs.

After the predesign investigations, EPA may determine that, consistent with Waste Management's proposed approach, residential well and vapor monitoring is not warranted and that groundwater monitoring is only needed at a limited number of existing groundwater monitoring wells. However, basing this decision on appropriately collected data for the site will ensure that whatever long-term monitoring is necessary is conducted in the appropriate locations and will generate a greater confidence in the results and the conclusions indicated by the data.

Comment PRP-153: *Additional hydrogeologic characterization is not necessary as stated at FS §1.5.4, p.33. The Warner Electric study adequately evaluated the hydrogeology that would be applicable to the Evergreen Manor study area since it is adjacent to the east. The regional studies by Wehrmann (1983 and 1984) show very consistent geology and hydrogeology in the broader region surrounding the entire study area. Wehrmann, Allen H., An Investigation of a Volatile Organic Chemical Plume in Northern Winnebago County, Illinois, State Water Survey Contract Report 346, Project No. 83/4001 (August 1984). This appears to be a simple hydrogeologic environment of unconfined sand and gravel with groundwater flowing generally along topography at 90 degrees toward the river.*

EPA Response PRP-153: It is not clear from Comment PRP-153 which portions of any additional proposed hydrogeologic characterization activities are not considered necessary. Comment PRP-153 references previous studies related to the Warner Electric site which is just east of the Evergreen Manor site. Therefore, EPA is assuming that Comment PRP-153 is questioning the need for additional characterization in this area.

Certainly, a large body of information may exist from studies conducted at the Warner site which have not been reviewed or were not available during the Evergreen Manor site evaluation. Additionally, numerous monitoring wells are known to be present in the area for the Warner Electric site for which data were not available during this study. To the extent that this data is relevant to the Evergreen Manor site, EPA agrees that it should be taken into account and may reduce the effort necessary to address identified data gaps, especially along the east side of the plume.

However, if the intent of Comment PRP-153 is to indicate that no additional hydrogeologic characterization is necessary anywhere to address identified data gaps, EPA does not wholly agree. As stated in the Groundwater Data Evaluation Report, EPA does not consider the existing monitoring well network to be currently sufficient due to the extreme size of the known plume. One identified data gap suggests that the lateral and vertical extent of the plume has not been adequately defined. While the plume appears to have diminished with time, there are large areas where no data exists on the inferred lateral edges, or where early data indicated that contamination was present but where no further work was conducted. The extent to which further characterization and monitoring is necessary will be determined during the remedial

design based on the results of the predesign investigations and on the results of any long term monitoring.

Comment PRP-154: *There is no vertical gradient in groundwater as seen in the water levels being similar in shallow and deep nested monitoring wells. {FS §1.5.4, p.33} Concern is expressed at GD §5.2, p.2, over a purported lack of knowledge of the vertical extent of the VOC contamination from 1990-1993 – although data from wells up to 100 feet is available. Similarly, if VOCs migrate to the river and have never been found to contaminate river water or sediment, knowing the vertical extent is not relevant. The assertion that there may be underflow beneath the river completely ignores the fact that the Rock River is a regional groundwater discharge feature. As Ms. Cibulskis pointed out in her presentation to the community, groundwater from the other side of the river also flows toward and discharges to the river. Therefore, it is a mathematical impossibility for there to be underflow beneath the river.*

EPA Response PRP-154: The fact that significant vertical gradients have not been observed in the few locations where nested wells are located (upgradient) suggests that overall lateral flow is towards the Rock River, as would be expected. Vertical gradients would be expected to increase in the upward direction as the flow system approaches a discharge area. While EPA does not dispute that the Rock River most likely acts as the primary local discharge feature of the site, vertical gradients in the vicinity of the river have not been confirmed. Only limited data has been gathered to date, and only for the upper 100 feet of the aquifer (less in many areas). The shallow unconsolidated aquifer in this area is known to be over 200 feet thick based on nearby municipal well logs. Additionally, the unconsolidated sand and gravel aquifer appears to be in direct contact with highly permeable sandstone bedrock aquifers due the site's location in an incised bedrock valley. Furthermore, chlorinated VOCs have been detected for years in nearby municipal wells at depths up to 700 feet bgs. While it is not disputed that the shallow portion of the local flow system most likely discharges to the Rock River, the development of secondary regional flow systems becomes more likely as the basin depth to width ratio increases. Simply stated, this is a very deep, apparently unbroken, aquifer system for which characterization has only been attempted in the top 100 feet, and it cannot be conclusively stated that all groundwater in the unconsolidated aquifer discharges locally to the Rock River. Verification of upward gradients throughout the unconsolidated aquifer in the vicinity of the Rock River, combined with verification of the lack of VOCs in the lower portions of the aquifer, may be sufficient to address this uncertainty and allow a reasonable conclusion to be drawn as to whether groundwater contamination from the Evergreen Manor site has migrated to deeper aquifers which may not discharge locally to the Rock River.

EPA's 1990-1993 evaluation is based on residential well data reported by the IDPH and the IEPA. These data were primarily collected in 1990 and 1991 and were limited relative to the overall size of the contaminated groundwater plume at the site. Also, only a few PCE results were reported. As shown in Figure 5-1 of the Groundwater Data Evaluation Report, a plume of TCE and PCE contaminated groundwater exceeding the MCLs was present in the subdivisions between 1990 and 1993. The highest levels, representing the apparent axis of the plume (indicated by TCE levels >25 µg/L) were located along a line extending from Mathew Avenue south along Blue Spruce, east of Hayloft, and extending nearly to the Rock River. Due to lack of data, the areas north of Mathew Avenue were only defined by sporadic residential well samples which generally indicated TCE concentrations below MCLs. Figure 5-3 of the same report is a cross-section which shows the estimated 1990 to1993 vertical extent and distribution of PCE

and TCE. The location of this cross section in relation to the site is shown on Figure 5-2 of the Groundwater Data Evaluation Report. As shown on the cross-section, the vertical extent of the TCE and PCE was inferred due to the limited amount of groundwater data available and the lack of specific well depth information for residential wells. The approximate depth interval at which groundwater was drawn for domestic use was based on the average depth of the residential wells in this area. The foregoing discussion clearly suggests an overall uncertainty in the vertical extent of the VOC contamination as reported in the residential well samples collected between 1990 and 1993.

To further define the extent of the VOC-contaminated plume, additional groundwater monitoring wells were installed and sampled between 1994 and 1996. A majority of the monitoring wells were completed as nested pairs with screened intervals at varying depths to provide additional vertical profile of the contaminant distribution. Groundwater sampling and analysis efforts were continued for the residential wells located in the subdivisions. In the Groundwater Data Evaluation Report, EPA mapped maximum TCE and PCE concentrations reported for each residence and monitoring well (Figure 5-4) to better define the plume boundaries as they existed between 1994 and 1999. The information provided by the sampling results from the expanded monitoring network indicates that the length of the plume was significantly larger than shown between 1990 and 1993. This establishes that the apparent source of the VOC contamination was most likely located in the industrial area around Rockton Road and Route 251.

As a result of the expanded monitoring network, additional PCE data were obtained to address the lack of PCE data from the previous reporting period. As shown in Figures 4-3 and 5-4 of the Groundwater Data Evaluation Report, elevated PCE concentrations (40 µg/L) were reported in the groundwater sample collected from monitoring well MW-103S (screened from 732 to 722 feet amsl). The highest PCE concentration reported in the adjacent monitoring well MW-103D (screened from 719 to 709 feet amsl) was 1 µg/L. PCE was also reported at concentrations exceeding the MCL in groundwater samples collected from monitoring wells MW-109D (screened from 706 to 696 feet amsl) and MW-105S (screened from 700 to 690 feet amsl).

Figure 5-5 of the Groundwater Data Evaluation Report shows an extensive zone of TCE-contaminated groundwater that extends from north of Dry Creek to the south and into the Rock River. The groundwater in the vicinity of Blue Spruce Drive and Straw Lane was found to have a TCE concentration of 26 µg/L. This concentration was significantly lower than the earlier TCE detections in this well that ranged from 50 to 75 µg/L in 1990 to early 1991. In 1993, the TCE concentrations in this well were reported to be 91 µg/L.

Concentrations of PCE above the MCL were reported on the north and south side of Dry Creek. However, as shown in Figure 5-5 of the Groundwater Data Evaluation Report, it appears that PCE is more prevalent and was reported at higher concentrations near monitoring well MW-103 (south of the Ecolab Facility). Based on this data, it is obvious that the vertical extent of the TCE and PCE contamination plume was not adequately defined during this time despite the additional monitoring wells that were installed.

U. S. EPA does not agree with the assertion that vertical profiling is not relevant because the VOCs are migrating to the river. Vertical delineation of groundwater

contamination is necessary to determine impacts to the deeper portion (>100 feet) of the aquifer which has not been characterized. This is also true of the shallow groundwater, which for the most part has not been characterized within the residential area, but which poses the greatest risk to residents via the vapor intrusion pathway. Similarly, the location of the center of the plume, horizontally and vertically, is also unclear. Although same-location sampling data, where available, show significant decreases in contaminant concentrations over time, actual concentrations in other areas of the plume could be somewhat higher than those indicated by the current monitoring well network and CPT sampling, which only provide limited horizontal and vertical data points. Additionally, these data points may not be located in the area and/or zones of highest contamination.

An important issue relates to the differences in the screened intervals of the residential and monitoring wells over different time periods. Groundwater data collected from 1990 to 1993 and the majority of the groundwater data collected from 1994 to 1999 have been derived from residential wells, most of which are believed to have been screened from 65 feet to 80 feet bgs. However, no information regarding the exact locations or addresses of these wells is available. In addition, existing well records do not show the elevation of the ground surface, making it difficult to determine which interval is the most contaminated. For example, if TCE is detected at 50 µg/L at Residence A but the concentration of TCE is only 14 µg/L in the adjacent Residence B, the difference may be caused by the screened depths of the wells or by a sharp concentration gradient in a horizontal direction. Since these residential wells no longer exist, this data cannot be collected in the future. In contrast, most groundwater data collected during recent investigations has been derived from monitoring wells which are screened at various depths ranging from 21 bgs to 100 feet bgs. This large difference in the screened intervals of the residential and monitoring wells also leads to significant uncertainties regarding actual groundwater trends.

It is important to note that vertical delineation assumes a greater significance if past releases were in the form of dense non-aqueous phase liquids (DNAPL) and if indeed, the contaminated groundwater is migrating beneath the Rock River. This may have resulted in very deep portions of the aquifer being contaminated, and shallower portions only exhibiting patterns of contamination consistent with that of residual contamination. Due to the uncertainty and data gaps identified in the Groundwater Data Evaluation Report, data may not be sufficient to adequately determine the exact location(s) and nature of the source(s). The additional investigations included in EPA's selected remedy will be valuable in further evaluating VOC distribution within the plume; aiding in determining whether deeper portions of the aquifer are likely to be contaminated; and verifying that contaminated groundwater discharges to the Rock River throughout the entire saturated thickness of the sand and gravel aquifer.

The southern boundary of the plume depicted in the Groundwater Data Evaluation Report was defined using a basic hydrologic scenario where the groundwater contained within the sand and gravel outwash aquifer is confined to shallow/local flow systems influenced by the nearby Rock River. This scenario assumes that the shallow VOC-contaminated groundwater flows towards the river, but does not flow beneath and beyond (to the south/west of) the Rock River. This conceptual model assumes that the Rock River acts as a local groundwater discharge zone and that vertical gradients are upward in the vicinity of the river, and is consistent with general hydrogeologic principles and is supported by the physical characteristics of the study area. Although attempts to map groundwater flow across the site conclude that the overall lateral

groundwater flow direction is toward the Rock River, insufficient spatial data points are available to evaluate local variation in groundwater flow patterns (direction and velocity). In other words, the presence and magnitude of vertical gradients in the vicinity of the Rock River has not been documented; therefore, insufficient evidence is currently available to state that all contaminated groundwater associated with the Evergreen Manor VOC plume discharges to the Rock River. In the event that VOC-contaminated groundwater is present at sufficient depths to be influenced more by regional flow regimes, it is possible that contaminants could be migrating beneath the Rock River. This uncertainty relating to underflow and contaminant transport can be minimized by conducting vertical profiling at appropriate locations on the south side of the Rock River.

Comment PRP-155: *Groundwater flow direction is not uncertain as suggested at FS §1.5.5, p.36 •1. This is a classic homogeneous and isotropic groundwater flow system, in which the flow is uniform and predictable; it does not warrant over-analysis as suggested by Weston's proposed plan. The primary direction of the plume has remained the same since 1991. The wells on Balsa (southeast portion of the subdivision) show the plume has not deviated to the southeast from its primary flow direction route.*

EPA Response PRP-155: Installing additional monitoring wells and piezometers in selected locations to gather hydrogeologic and groundwater chemical data is not "over-analysis." While EPA does not dispute the overall lateral flow direction toward the Rock River, the number and placement of existing monitoring wells is not sufficient to document lateral (and vertical) flow based on the extreme size of the plume and the presence of potential groundwater receptors (as identified in the Groundwater Data Evaluation Report) along the presumed lateral edges of the plume. As stated in EPA Response PRP-153, to the extent that other appropriately collected monitoring well data and information are available and applicable to the Evergreen Manor site, this data can be used to address data gaps concerning flow conditions. To date, the water table contour maps developed for the Evergreen Manor site have been fairly simple straight-line equipotential maps based on a pattern of existing wells which does not allow for interpretation of the flow system for any significant distance laterally given the overall length of the plume. Installing additional wells/piezometers (possibly combined with data from other wells not previously taken into account) will document the lateral flow characteristics over the entire flow regime and serve to reconcile some of the lack of correlation between plume maps and flow maps (see Groundwater Data Evaluation Report). Additional monitoring wells will also serve to document groundwater chemistry in the more questionable areas of the site and can serve as long-term monitoring points.

Comment PRP-156: *The potentiometric surface map (Groundwater Data Evaluation Report Figure 3-2) is based on 13 measurement locations. This figure indicates that the potentiometric surface is very simple. Groundwater simply flows in a southerly direction towards the Rock River. This, by itself is an indication that groundwater discharges to the Rock River.*

EPA Response PRP-156: See EPA Response PRP-154. The fact that significant vertical gradients have not been observed in the few locations where nested wells are located (upgradient) suggests that overall lateral flow is towards the Rock River, as would be expected. Vertical gradients would be expected to increase in the upward direction as the flow system approaches a discharge area. While EPA does not dispute that the Rock River likely acts as the primary local discharge feature of the site, vertical

gradients in the vicinity of the river have not been confirmed. Only limited data has been gathered to date, and only for the upper 100 feet of the aquifer (less in many areas). The shallow unconsolidated aquifer in this area is known to be over 200 feet thick based on nearby municipal well logs. Additionally, the unconsolidated sand and gravel aquifer appears to be in direct contact with highly permeable sandstone bedrock aquifers due the site's location in an incised bedrock valley. Furthermore, chlorinated VOCs have been detected for years in nearby municipal wells at depths up to 700 feet bgs. While EPA does not dispute that the shallow portion of the local flow system most likely discharges to the Rock River, the development of secondary regional flow systems becomes more likely as the basin depth to width ratio increases. Simply stated, this is a very deep, apparently unbroken, aquifer system for which characterization has only been attempted in the top 100 feet, and it cannot be conclusively stated that all groundwater in the unconsolidated aquifer discharges locally to the Rock River. Verification of upward gradients throughout the unconsolidated aquifer in the vicinity of the Rock River, combined with verification of the lack of VOCs in the lower portions of the aquifer, may be sufficient to address this uncertainty and allow a reasonable conclusion to be drawn as to whether groundwater contamination from the Evergreen Manor site has migrated to deeper aquifers which may not locally discharge to the Rock River.

Comment PRP-157: *The geologic cross section (Groundwater Data Evaluation Report Figure 3 -1) illustrates that there is no confining layer or other feature that would allow flow to be isolated from the hydraulic effects of the Rock River. This is confirmed by the minimal vertical gradients indicated in the RI, where the "biggest difference in groundwater elevations at any well cluster measured was 0.08 ft." (RI Section 5, p. 9).*

EPA Response PRP-157: See EPA Response PRP-156.

Comment PRP-158: *Although the "Rock River is presumed to be the groundwater discharge location for the shallow sand and gravel aquifer" (Groundwater Data Evaluation Report Section 3, p. 7), EPA's contractor implies an uncertainly that is unwarranted based on the 19 years of investigative data available (CRA 1997).*

EPA Response PRP-158: See EPA Response PRP-156.

Comment PRP-159: *EPA claims that "[a]lthough attempts to map groundwater flow across the site conclude that the overall lateral groundwater flow direction is towards the Rock River, insufficient spatial data points are available to evaluate local variation in groundwater flow patterns (direction and velocity). This is especially true with regards to vertical flow characteristics across the site." (Groundwater Data Evaluation Report Section 7, p. 8). EPA has proposed a substantial field program (11 new piezometers) to address this perceived deficiency (Groundwater Data Evaluation Report 7, p. 10). However, EPA admits that the "gradient across the site is fairly uniform" and the potentiometric surface map (Figure 3-2) confirms that the potentiometric surface is very simple. In fact, groundwater flow at the Evergreen Manor Site "have generally remained constant" over 19 years of investigation (CRA 1997, p. 8). Furthermore, vertical flow has already been evaluated in the RI. Vertical flow has little significance because the "biggest difference in groundwater elevations at any well cluster measured was 0.08 ft." (RI Section 5, p. 9). This reflects earlier conclusions by CRA that suggest "predominantly horizontal flow within the upper 100 feet of the sand and gravel deposits" (CRA 1997,p 8).*

EPA Response PRP-159: See EPA Response PRP-156.

Comment PRP-160: *EPA should withdraw the Agency's Proposed Plan.*

EPA Response PRP-160: EPA developed its Proposed Plan for the Evergreen Manor site in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, 42 U.S.C. §§ 9601-9675. The Proposed Plan is consistent with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 C.F.R. Part 300, to the extent practicable, and is based on the information in the Administrative Record file for this site and applicable and relevant guidance. Based on this, EPA does not see any valid reason as to why it should withdraw its Proposed Plan for the site.

Comment PRP-161: *EPA should modify the Agency's proposed selection of Alternative 3 and, instead, select either Alternative 1B or Alternative 3B proposed in Comment PRP-121 as the final cleanup plan.*

EPA Response PRP-161: Alternative 1B would not protect human health and the environment or comply with ARARS. Also, EPA's Alternative 3 does not preclude a final limited monitoring plan consistent with that outlined in Alternative 3B. See EPA Response PRP-121.

Comment PRP-162: *EPA should withdraw the Agency's proposed selection of Alternative 3 as the final cleanup plan, which would properly preclude an unwarranted study which may implicate residents as responsible parties at the site.*

EPA Response PRP-162: EPA disagrees that the investigation and monitoring activities included in Alternative 3 are unwarranted. In fact, as discussed in several of EPA's previous responses (see other EPA PRP Responses including EPA Responses PRP-1, PRP-29, PRP-34 and PRP-105), these studies are necessary to ensure that Alternative 3 adequately protects human health and the environment. See EPA Responses PRP-116 and PRP-143 concerning residents being implicated as responsible parties at the site.

Comment PRP-163: *EPA would be acting in an arbitrary and capricious fashion not in accordance with the NCP and law if the Agency issues a Record of Decision selecting Alternative 3 as the final cleanup plan.*

EPA Response PRP-163: EPA developed its selected remedy for the Evergreen Manor site, Alternative 3, Monitored Natural Attenuation, in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, 42 U.S.C. §§ 9601-9675. EPA's selected remedy is consistent with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 C.F.R. Part 300, to the extent practicable, and is based on the information in the Administrative Record file for this site and applicable and relevant guidance. EPA's selected remedy for the Evergreen Manor site is not arbitrary and capricious.

FIGURES

LEGEND

- SURFACE WATER
- MUNICIPAL WELL
- GROUNDWATER MONITORING WELL
- S,D IDENTIFIES WELL CLUSTERS WITH A SHALLOW AND DEEP WELL
- CPT SAMPLING LOCATION
- MUNICIPAL WATER MAIN (NOT ALL HOMES ALONG THE WATER MAIN ARE CONNECTED)
- SITE BOUNDARY (BASED ON MAXIMUM EXTENT OF VOC)

NOTES:

1. BASE MAP ADAPTED FROM CAD FILES PROVIDED BY WINNEBAGO COUNTY AND ORTHO (USGS, 1999).
2. WATERMAIN LOCATIONS ADAPTED FROM NORTH PARK WATER DISTRICT BY McCLURE ENGINEERING ASSOCIATES, INC. (2002 VERSION) AND VILLAGE OF ROCKTON WATER DEPARTMENT (1998 VERSION).

SOURCES:

- USGS EARTH SOURCES OBSERVATION SYSTEMS DATA CENTER DATED: 1999/04/24.

N

0 1200'
SCALE

FIGURE 1-2

AD93\100\14403.dwg

REDACTED

RESPONSE ACTION CONTRACT	SITE PLAN
U.S. EPA CONTRACT No. 68-W7-0026 WORK ASSIGNMENT No. 139-RICO-05MZ DOCUMENT CONTROL No. RFW139-2A-ANOJ	EVERGREEN MANOR SITE Roscoe, Illinois

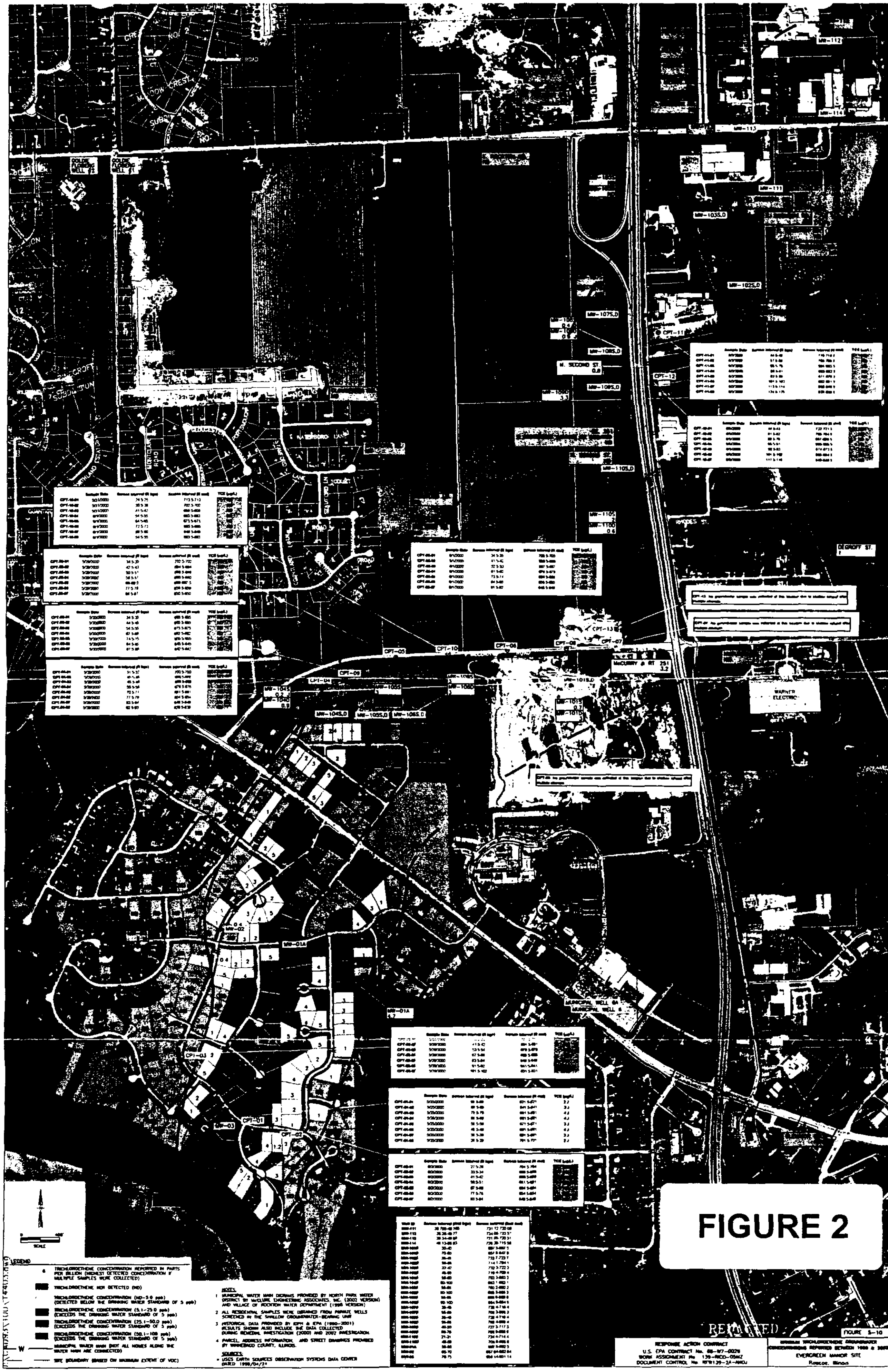
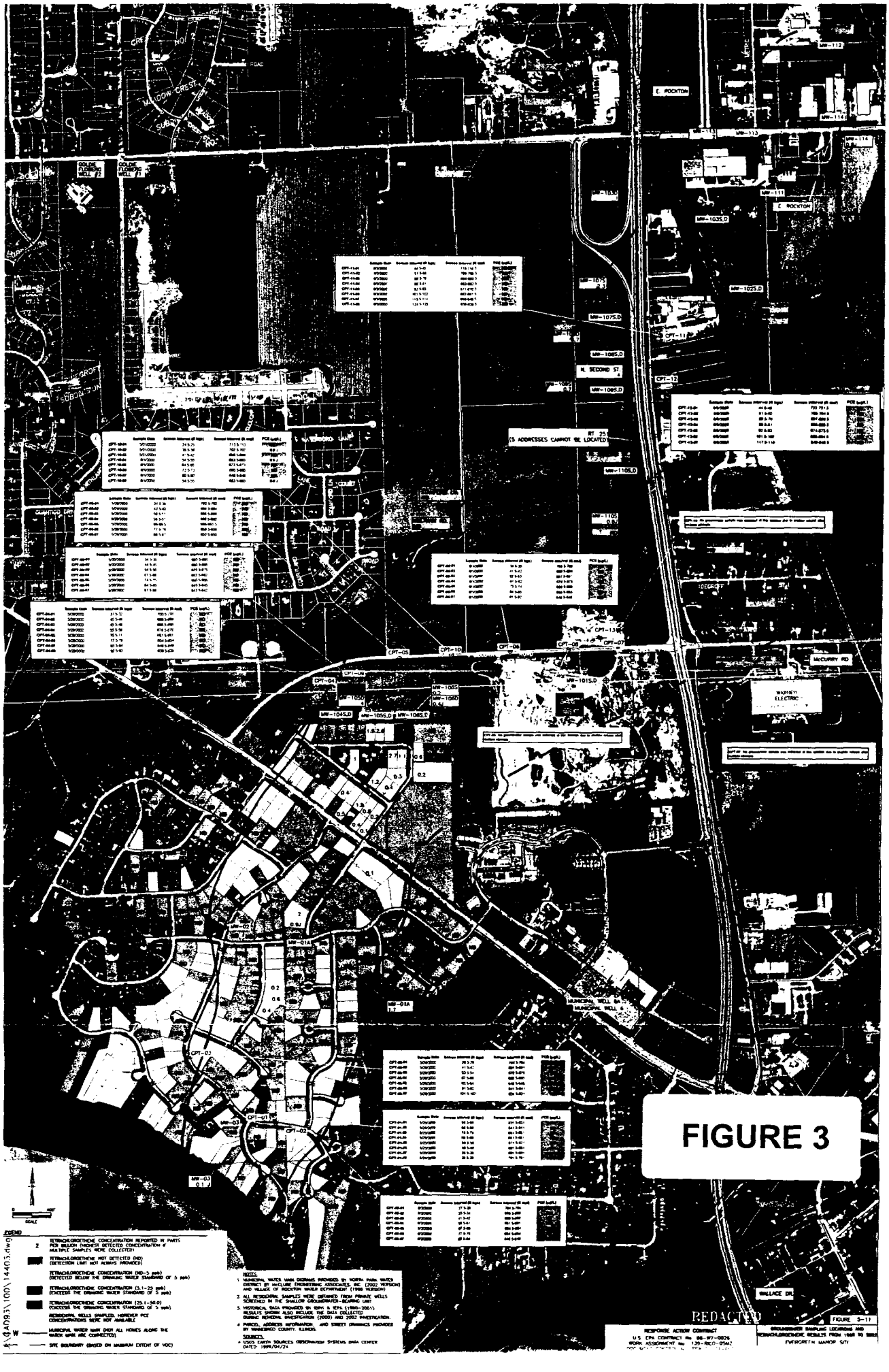

MW-112
MW-114
MW-113
MW-111
MW-103S,D
MW-102S,D
MW-107S,D
CPT-11
MW-108S,D
N. SECOND ST.
CPT-12
MW-109S,D
MW-110S,D
RHODES ST.
DEGROFF ST.
CPT-13
CPT-05
CPT-10
CPT-06
CPT-08
CPT-07
McCURRY & RT 251
CPT-09
CPT-04
MW-101S,D
WARNER ELECTRIC
MW-104S,D
MW-105S,D
MW-106S,D
MW-02
MW-01A
MUNICIPAL WELL #4
MUNICIPAL WELL 6
CPT-03
CPT-01
CPT-02
MW-03
LEGEND
NOTES:
SOURCES:
RESPONSE ACTION CONTRACT
U.S. EPA CONTRACT No. 68-W7-0026
WORK ASSIGNMENT No. 139-RICO-05MZ
DOCUMENT CONTROL No. RFW139-2A-AMOJ
EVERGREEN MANOR SITE
Roscoe, Illinois
FIGURE 5-10
REDACTED

FIGURE 2


MEADOW CREST DR
E. ROCKTON
MW-112
MW-113
MW-114
MW-111
MW-103D
MW-103S
MW-103S.D
MW-107S.D
MW-107D
MW-108S.D
MW-108D
MW-110S.D
MW-110D
MW-104S.D
MW-104D
MW-105S.D
MW-105D
MW-106S.D
MW-106D
MW-101S.D
MW-101D
MW-01A
MW-02
MW-03
CPT-01
CPT-02
CPT-03
CPT-04
CPT-05
CPT-06
CPT-07
CPT-08
CPT-09
CPT-10
CPT-11
CPT-12
CPT-13
N. SECOND ST
McCURRY RD
WARNER ELECTRIC
WALLACE DR
RT. 251
IS ADDRESSES CANNOT BE LOCATED
MUNICIPAL WELL #2
MUNICIPAL WELL #1
SOLDIER FIELD WELL #2
SOLDIER FIELD WELL #1
REDACTED
FIGURE 3
FIGURE 3-11
SCALE
LEGEND
TETRACHLOROETHENE CONCENTRATION REPORTED IN PARTS PER BILLION (HIGHEST DETECTED CONCENTRATION IF MULTIPLE SAMPLES WERE COLLECTED)
TETRACHLOROETHENE NOT DETECTED (ND) (DETECTION LIMIT NOT ALWAYS PROVIDED)
TETRACHLOROETHENE CONCENTRATION (ND–5 ppb) (DETECTED BELOW THE DRINKING WATER STANDARD OF 5 ppb)
TETRACHLOROETHENE CONCENTRATION (5.1–25 ppb) (EXCEEDS THE DRINKING WATER STANDARD OF 5 ppb)
TETRACHLOROETHENE CONCENTRATION (25.1–50.0) (EXCEEDS THE DRINKING WATER STANDARD OF 5 ppb)
INDICATES WELLS SAMPLED, HOWEVER PCE CONCENTRATIONS WERE NOT AVAILABLE
MUNICIPAL WATER MAIN (NOT ALL HOMES ALONG THE WATER MAIN ARE CONNECTED)
SITE BOUNDARY (BASED ON MAXIMUM EXTENT OF VOC)
NOTES:
1. TOPOGRAPHIC WATER MAIN DIGITIZING PROVIDED BY NORTH PARK WATER DISTRICT BY McCLURE ENGINEERING ASSOCIATES, INC. (2002 VERSION) AND VILLAGE OF ROCKTON WATER DEPARTMENT (1980 VERSION)
2. ALL RESIDENTIAL SAMPLES WERE OBTAINED FROM PRIVATE WELLS SCREENED IN THE SHALLOW GROUNDWATER-BEARING UNIT
3. HISTORICAL DATA PROVIDED BY IEPA & IETA (1985–2001) RESULTS SHOWN ALSO INCLUDE THE DATA COLLECTED DURING SECTION 106 INVESTIGATION (2000) AND 2002 INVESTIGATION.
4. PARCEL, ADDRESS INFORMATION, AND STREET DRAWINGS PROVIDED BY WINNEBAGO COUNTY, ILLINOIS.
SOURCES:
• USGS EARTH SOURCES OBSERVATION SYSTEMS (EMA CENTER DATED 1999/04/24
RESPONSE ACTION CONTRACT
U.S. EPA CONTRACT No. 68-W7-0026
WORK ASSIGNMENT No. 129-RICT-05N2
GROUNDWATER SAMPLING LOCATIONS AND TETRACHLOROETHENE RESULTS FROM 1998 TO 2002
EVERGREEN MANOR SITE
\\4409J\100\14405.dwg

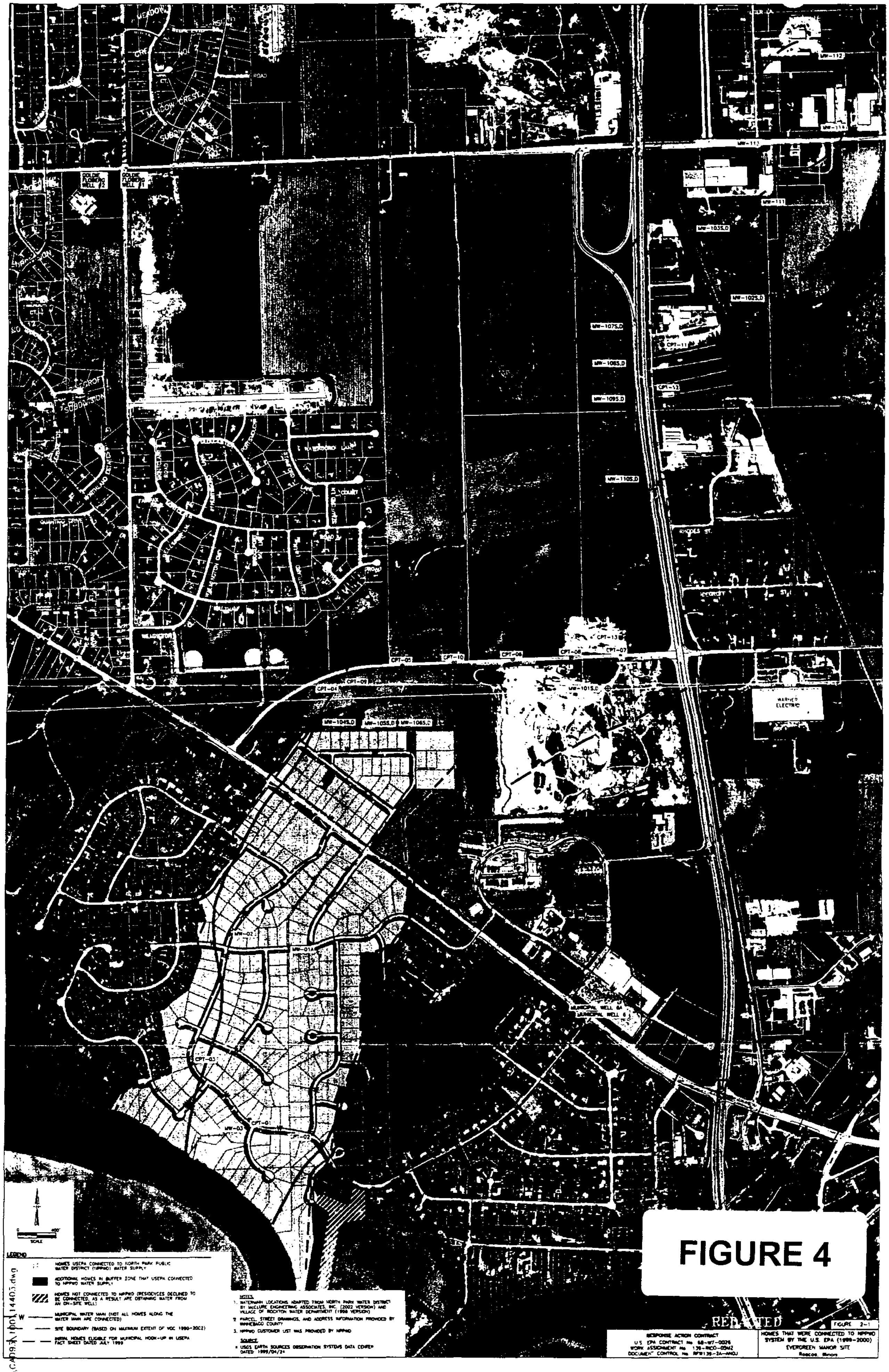

SCALE
0
400'
LEGEND
HOMES USEPA CONNECTED TO NORTH PARK PUBLIC WATER DISTRICT (NPPWD) WATER SUPPLY
ADDITIONAL HOMES IN BUFFER ZONE THAT USEPA CONNECTED TO NPPWD WATER SUPPLY
HOMES NOT CONNECTED TO NPPWD (RESIDENCES DECLINED TO BE CONNECTED, AS A RESULT ARE OBTAINING WATER FROM AN ON-SITE WELL)
W
MUNICIPAL WATER MAIN (NOT ALL HOMES ALONG THE WATER MAIN ARE CONNECTED)
SITE BOUNDARY (BASED ON MAXIMUM EXTENT OF VOC 1990-2002)
INITIAL HOMES ELIGIBLE FOR MUNICIPAL HOOK-UP IN USEPA FACT SHEET DATED JULY 1999
NOTES
1. WATERMAIN LOCATIONS ADAPTED FROM NORTH PARK WATER DISTRICT BY McCLURE ENGINEERING ASSOCIATES, INC. (2002 VERSION) AND VILLAGE OF ROCKTON WATER DEPARTMENT (1998 VERSION)
2. PARCEL, STREET DRAWINGS, AND ADDRESS INFORMATION PROVIDED BY WINNEBAGO COUNTY
3. NPPWD CUSTOMER LIST WAS PROVIDED BY NPPWD
SOURCE
• USGS EARTH SOURCES OBSERVATION SYSTEMS DATA CENTER DATED 1999/04/24
RESPONSE ACTION CONTRACT
U.S. EPA CONTRACT No. 68-W7-0026
WORK ASSIGNMENT No. 139-RICO-05M2
DOCUMENT CONTROL No. RFW139-2A-AMOJ
FIGURE 2-1
HOMES THAT WERE CONNECTED TO NPPWD SYSTEM BY THE U.S. EPA (1999-2000)
EVERGREEN MANOR SITE
Roscoe, Illinois
\CAD\9...\001\14405.dwg

FIGURE 4

FIGURE 5

REVISED

FIGURE 4-5

RESPONSE ACTION CONTRACT
U.S. EPA CONTRACT No. 68-W7-0026
WORK ASSIGNMENT No. 139-RICO-05M7

MAXIMUM TRICHLOROETHENE GROUNDWATER CONCENTRATIONS REPORTED BETWEEN 2000 & 2002
CYPRESS MANOR SITE


SAMPLE ID
SCREEN INTERVAL (FT BGS)
SCREEN INTERVAL (FT MSL)
PCE (ug/L)
CPT-10-02
35.5
702-702.5
0.0 J
NO GROUNDWATER SAMPLES WERE TAKEN DUE TO SHALLOW REFUSAL AFTER MULTIPLE ATTEMPTS
LEGEND
TETRACHLOROETHENE CONCENTRATION REPORTED IN PARTS PER BILLION (HIGHEST DETECTED CONCENTRATION IF MULTIPLE SAMPLES WERE COLLECTED)
TETRACHLOROETHENE NOT DETECTED
TETRACHLOROETHENE CONCENTRATION (ND-5.0 ppb) (DETECTED BELOW THE DRINKING WATER STANDARD OF 5 ppb)
TETRACHLOROETHENE CONCENTRATION (5.1-25.0 ppb) (EXCEEDS THE DRINKING WATER STANDARD OF 5 ppb)
MUNICIPAL WATER MAIN (NOT ALL HOMES ALONG THE WATER MAIN ARE CONNECTED)
SITE BOUNDARY (BASED ON MAXIMUM EXTENT OF VOC)
SCALE
NOTES:
1. WATERMAIN LOCATIONS ADAPTED FROM NORTH PARK WATER DISTRICT BY McCLURE ENGINEERING ASSOCIATES, INC. (2002 VERSION) AND VILLAGE OF ROCKTON WATER DEPARTMENT (1998 VERSION)
2. HISTORICAL RESIDENTIAL WELL DATA INCLUDE DATA PROVIDED BY IEPA, IDPH, AND 2000 AND 2002 INVESTIGATION
3. PARCEL, ADDRESS INFORMATION, AND STREET DRAWINGS PROVIDED BY WINNEBAGO COUNTY, ILLINOIS
SOURCES:
• USGS EARTH SOURCES OBSERVATION SYSTEMS DATA CENTER DATED 1999/04/24
RESPONSE ACTION CONTRACT
U.S. EPA CONTRACT No. 68-W7-0079
WORK ASSIGNMENT No. 136-RCCT-05A7
FIGURE 4-6
MAXIMUM TETRACHLOROETHENE GROUNDWATER CONCENTRATIONS REPORTED BETWEEN 2000 & 2002

FIGURE 6

FIGURE 7

LEGEND

- SURFACE WATER
- MUNICIPAL WELL
- GROUNDWATER MONITORING WELL
- S,D IDENTIFIES WELL CLUSTERS WITH A SHALLOW AND DEEP WELL
- CPT SAMPLING LOCATION
- MUNICIPAL WATER MAIN (NOT ALL HOMES ALONG THE WATER MAIN ARE CONNECTED)
- SITE BOUNDARY (BASED ON MAXIMUM EXTENT OF VOC)

NOTES:

1. BASE MAP ADAPTED FROM CAD FILES PROVIDED BY WINNEBAGO COUNTY AND ORTHO (USGS, 1999).
2. WATERMAIN LOCATIONS ADAPTED FROM NORTH PARK WATER DISTRICT BY McCLURE ENGINEERING ASSOCIATES, INC. (2002 VERSION) AND VILLAGE OF ROCKTON WATER DEPARTMENT (1998 VERSION).
3. THE ADDRESSES SHOWN ON THIS FIGURE MAY INCLUDE NOW RESIDENTIAL (INDUSTRIAL) PROPERTIES.

SOURCES:

- POLK CITY DIRECTORIES – ROCKFORD AND BELVIDERE, IL (2002)
- PARTIAL LIST OF ADDRESSES PROVIDED BY WINNEBAGO COUNTY HEALTH DEPARTMENT.
- USGS EARTH SOURCES OBSERVATION SYSTEMS DATA CENTER DATED: 1999/04/24.

N

0 1200'
SCALE

FIGURE 3-4

I:\CAD\S\100\1440\3.dwg

REDACTED

RESPONSE ACTION CONTRACT
U.S. EPA CONTRACT No. 68-W7-0026
WORK ASSIGNMENT No. 139-RICO-05MZ
DOCUMENT CONTROL No. RFW139-2A-ANOJ

POTENTIAL RESIDENCES NOT CONNECTED TO THE NPPWD
EVERGREEN MANOR SITE
Roscoe, Illinois

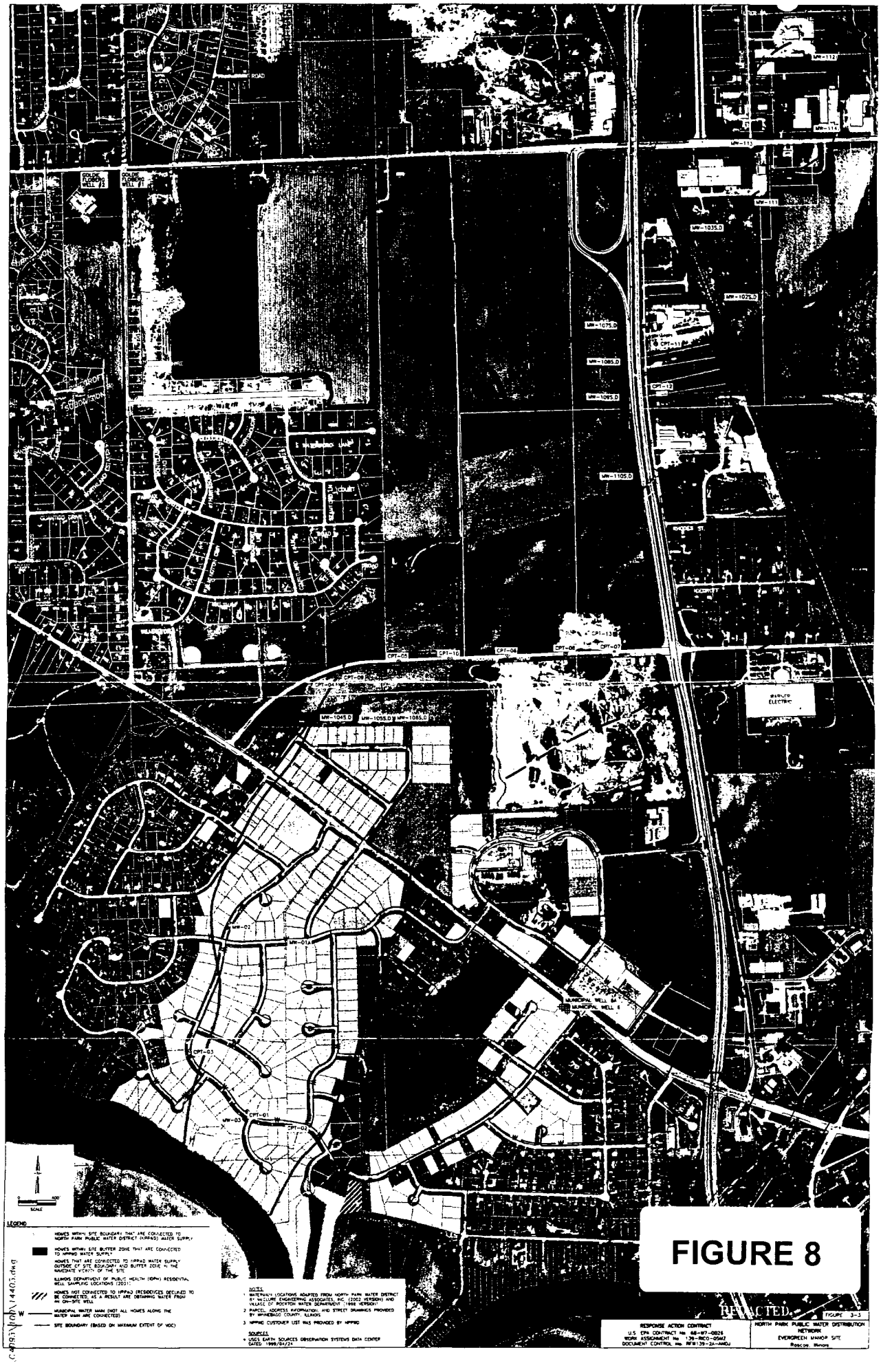

LEGEND
HOMES WITHIN SITE BOUNDARY THAT ARE CONNECTED TO NORTH PARK PUBLIC WATER DISTRICT (NPPWD) WATER SUPPLY
HOMES WITHIN SITE BUFFER ZONE THAT ARE CONNECTED TO NPPWD WATER SUPPLY
HOMES THAT ARE CONNECTED TO NPPWD WATER SUPPLY OUTSIDE OF SITE BOUNDARY AND BUFFER ZONE IN THE IMMEDIATE VICINITY OF THE SITE
ILLINOIS DEPARTMENT OF PUBLIC HEALTH (IDPH) RESIDENTIAL WELL SAMPLING LOCATIONS (2001)
HOMES NOT CONNECTED TO NPPWD (RESIDENCES DECLINED TO BE CONNECTED AS A RESULT ARE OBTAINING WATER FROM AN ON-SITE WELL)
MUNICIPAL WATER MAIN (NOT ALL HOMES ALONG THE WATER MAIN ARE CONNECTED)
SITE BOUNDARY (BASED ON MAXIMUM EXTENT OF VOC)
NOTES
1 WATERMAIN LOCATIONS ADAPTED FROM NORTH PARK WATER DISTRICT BY McCLURE ENGINEERING ASSOCIATES, INC. (2002 VERSION) AND VILLAGE OF ROCKTON WATER DEPARTMENT (1998 VERSION)
2 PARCEL ADDRESS INFORMATION AND STREET DRAWINGS PROVIDED BY WINNEBAGO COUNTY, ILLINOIS
3 NPPWD CUSTOMER LIST WAS PROVIDED BY NPPWD
SOURCES
• USGS EARTH SOURCES OBSERVATION SYSTEMS DATA CENTER DATED: 1998/04/24
REDACTED
RESPONSE ACTION CONTRACT
U.S. EPA CONTRACT No. 68-W7-0026
WORK ASSIGNMENT No. 76-RICO-05A2
DOCUMENT CONTROL No. RFB139-2A-ANDJ
NORTH PARK PUBLIC WATER DISTRIBUTION NETWORK
EVERGREEN MANOR SITE
Roscoe, Illinois
FIGURE 3-1

FIGURE 8

FIGURE 9

LEGEND

- SURFACE WATER
- MUNICIPAL WELL
- GROUNDWATER MONITORING WELL
- S,D IDENTIFIES WELL CLUSTERS WITH A SHALLOW AND DEEP WELL
- CPT SAMPLING LOCATION
- MUNICIPAL WATER MAIN (NOT ALL HOMES ALONG THE WATER MAIN ARE CONNECTED)
- SITE BOUNDARY (BASED ON MAXIMUM EXTENT OF VOC)
- EXTENT OF VOC DETECTIONS IN GROUNDWATER (BASED ON 2000 AND 2002 INVESTIGATION) DASHED WHERE INFERRED
- PROPOSED EXTRACTION WELL
- PROPOSED TREATMENT BUILDING
- PROPOSED TRANSFER PIPING
- PROPOSED RIVER OUTFALL

NOTES:

1. BASE MAP ADAPTED FROM CAD FILES PROVIDED BY WINNEBAGO COUNTY AND ORTHO (USGS, 1999).
2. WATERMAIN LOCATIONS ADAPTED FROM NORTH PARK WATER DISTRICT BY McCLURE ENGINEERING ASSOCIATES, INC. (2002 VERSION) AND VILLAGE OF ROCKTON WATER DEPARTMENT (1998 VERSION).

SOURCES:

- USGS EARTH SOURCES OBSERVATION SYSTEMS DATA CENTER DATED: 1999/04/24.

N

0 1200'
SCALE

FIGURE 4-1

I:\CAD93\100\1440.5.dwg

RESPONSE ACTION CONTRACT
U.S. EPA CONTRACT No. 68-W7-0026
WORK ASSIGNMENT No. 139-RICO-05MZ
DOCUMENT CONTROL No. RFW139-2A-ANPK

ALTERNATIVE 2: GENERAL LAYOUT
EVERGREEN MANOR SITE
Roscoe, Illinois

TABLES

TABLE 1-a
Chemical Concentrations at Evergreen Manor Site (2000 and 2002)

Residential Wells and Groundwater Samples

Chemical	Residential Wells			Groundwater		
	Detected Concentrations (ug/l)	Frequency of Detection	Maximum Concentration Location	Detected Concentrations (ug/l)	Frequency of Detection (1)	Maximum Concentration Location
1,1,1-Trichloroethane	0.9 - 5	6/22	RW-07	0.29 - 3	12/22	MW-103, MW-05, CPT-11
1,1-Dichloroethane	ND			0.19 - 2	4/22	CPT-11
1,1-Dichloroethene	ND			0.16 - 0.2	1/22	MW-03
2-Butanone	ND			16	1/22	CPT-05
Acetone	0.6 - 0.8	2/22	RW-03	1 B - 470	11/22	CPT-02
Benzene	ND			0.5 - 0.6	2/22	CPT-09
Chloroform	0.9	1/22	RW-08	0.23	1/22	MW-02 *(replaced RW-08)*
Cis-1,2-Dichloroethene	2	1/22	RW-04	0.39 - 2	3/22	MW-105
Ethyl benzene	ND			0.6	1/22	CPT-09
Freon 113	ND			2 - 300	2/22	MW-103
m, p-xylene	ND			0.5 - 0.7	3/22	CPT-06, CPT-09
Methylene chloride	ND			0.5	1/22	CPT-03
PCE	0.9 - 2	2/22	RW-04	0.18 - 9	9/22	MW-103
Toluene	1B - 2 B	9/22	RW-13, RW-14, RW-15, RW-17, RW-18, RW-22	0.5 - 3	10/22	CPT-11
TCE	0.7 - 6	3/22	RW-04	0.24 - 7.2	5/22	MW-03
o-Xylene	ND			0.6	2/22	CPT-02, CPT-11

ND - Not detected
- Not available
B - Chemical detected in blank sample but at a concentration less than 10 times the reported sample concentration.
(1) Shallow and deep wells and multiple depths at CPT locations considered 1 location.

TABLE 1-b
Chemical Concentrations at Evergreen Manor Site (2000 - 2002)

Soil Gas and Indoor Air

Chemical	Soil Gas			Indoor Air		
	Detected Concentrations (ug/m3)	Frequency of Detection (1)	Maximum Concentration Location	Detected Concentrations (ug/m3)	Frequency of Detection (1)	Maximum Concentration Location
1,1,1-Trichloroethane	0.2 - 4	4/4	Home B	0.21 - 5.3	4/4	Home A
1,1-Dichloroethane	NA			NA		
1,1-Dichloroethene	NA			NA		
2-Butanone	1.6 - 16	4/4	Home C	2.4 - 27	4/4	Home D
Acetone	19 - 62	4/4	Home B	25 - 120	4/4	Home D
Benzene	1.2 - 31	4/4	Home A	0.72 - 22	4/4	Home D
Chloroform	0.86 - 6	3/4	Home B	0.42 - 3	4/4	Home D
Cis-1,2-Dichloroethene	ND			ND		
Ethyl benzene	0.98 - 41	4/4	Home A	0.48 - 13	4/4	Home B
Freon 113	0.4 - 0.78	4/4	Home B, Home D	0.42 - 0.46	4/4	Home C
m,p-xylene	1.8 - 60	4/4	Home C	1.3 - 57	4/4	Home B
Methylene chloride	0.55 - 0.98	4/4	Home C	0.88 - 99	4/4	Home B
PCE	0.28 - 190	4/4	Home C	0.7 - 11	4/4	Home B
Toluene	2.5 - 150	4/4	Home C	4.2 - 68	4/4	Home D
TCE	0.52 - 9.5	3/4	Home C	ND		
o-Xylene	0.73 - 25	4/4	Home A	0.55 - 13	4/4	Home B

NA - Not analyzed
ND - Not detected
(1) Each home considered 1 location.

TABLE 1-c
Chemical Concentrations at Evergreen Manor Site (2000 - 2002)

Surface Water and Sediment In Rock River Within and Downstream of Groundwater Discharge Zone

Chemical	Surface Water			Sediment		
	Detected Concentrations (ug/l)	Frequency of Detection	Maximum Concentration Location	Detected Concentrations (ug/kg)	Frequency of Detection	Maximum Concentration Location
1,1,1-Trichloroethane	ND			ND		
1,1-Dichloroethane	ND			ND		
1,1-Dichloroethene	ND			ND		
2-Butanone	ND			3	1/10	SD-04
Acetone	ND			ND		
Benzene	ND			ND		
Chloroform	ND			ND		
Cis-1,2-Dichloroethene	ND			ND		
Ethyl benzene	ND			ND		
Freon 113	ND			2 - 8	2/10	SD-01
m,p-xylene	ND			ND		
Methylene chloride	ND			ND		
PCE	ND			ND		
Toluene	ND			4 - 17	2/10	SD-01
TCE	ND			ND		
o-Xylene	ND			ND		

ND - Not detected

TABLE 2
Chemicals of Concern in Groundwater
2000 Risk Assessment

Chemical	Detected Concentrations		Units	Screening Toxicity Value	Chemical of Concern?
	Minimum	Maximum			
1,1,1-Trichloroethane	0.6	5	ug/l	79	NO
1,1-Dichloroethane		2	ug/l	70	NO
1,1-Dichloroethene	-	-	ug/l		NO
2-Butanone		16	ug/l	190	NO
Acetone	0.6	100	ug/l	61	YES
Benzene	0.5	0.6	ug/l	0.04	YES
Cis-1,2-Dichloroethene	1	2	ug/l	6.1	NO
Ethyl benzene		0.6	ug/l	130	NO
Freon 113	2	300	ug/l	NA	NO
m,p-xylene	0.5	0.7	ug/l	140	NO
Methylene chloride		0.5	ug/l	0.43	YES
PCE	0.6	9	ug/l	0.11	YES
Toluene	1	3	ug/l	72	NO
TCE	0.7	6	ug/l	0.16	YES
o-Xylene		0.6	ug/l	140	NO

- Not detected
NA Not available
(1) The screening toxicity value is the risk-based IEPA Tiered Approach to Cleanup Objectives Value for each chemical adjusted to a cancer risk of 1 x 10-7 and a noncancer hazard index of 0.1.

TABLE 3
Exposure Point Concentrations in Groundwater
2000 Risk Assessment

Chemical	Detected Concentrations		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure	Rationale
	Minimum	Maximum						
Acetone	0.6	100	ug/l	34/108	100	ug/l	Maximum	Undefined center of plume
Benzene	0.5	0.6	ug/l	3/108	0.6	ug/l	Maximum	Undefined center of plume
Methylene chloride		0.5	ug/l	1/108	0.5	ug/l	Maximum	Undefined center of plume
PCE	0.6	9	ug/l	5/108	9	ug/l	Maximum	Undefined center of plume
TCE	0.7	6	ug/l	14/108	6	ug/l	Maximum	Undefined center of plume

This table presents the chemicals of concern (COCs) and exposure point concentration for each of the COCs detected in groundwater in the 2000 Risk Assessment (i.e., the concentrations that will be used to estimate the exposure and risk from the COCs in the groundwater). The table includes the range of concentrations detected fro each COC, as well as the frequency of detection (i.e., the number of times the chemical was detected in the samples collected at the site), the exposure point concentration, and how the exposure point concentration was derived. The table indicates that acetone was the most frequently detected chemical at the site. The 2000 Risk Assessment used the maximum concentrations detected as the exposure point concentrations because the center of the contaminated groundwater plume is undefined and actual groundwater concentrations could be higher than those shown.

TABLE 4-a
Toxicity Data
Groundwater Exposure
2000 Risk Assessment

Cancer Toxicity Data

Pathway: Ingestion, Dermal

Chemical	Oral Cancer Slope Factor	Dermal Cancer Slope Factor	Slope Factor Units	Weight of Evidence/ Cancer Guideline Description	Source	Date
Acetone	NC	NC	(mg/kg)/day	D	IRIS	7/7/00
Benzene	5.5E-02	5.5E-02	(mg/kg)/day	A/leukemia	IRIS	7/7/00
Methylene chloride	7.5E-03	7.5E-03	(mg/kg)/day	B2/hepatocellular	IRIS	7/7/00
PCE	5.2E-02	5.2E-02	(mg/kg)/day	NA/liver	NCEA/Region 9	11/29/99
TCE	1.1E-02	1.1E-02	(mg/kg)/day	NA	NCEA/Region 9	11/29/99

Pathway: Inhalation

Chemical	Unit Risk	Units	Adjustment	Inhalation Cancer Slope Factor	Units	Weight of Evidence/ Cancer Guideline Description	Source	Date
Acetone	NC	-	-	-	-	D	IRIS	7/7/00
Benzene	7.8E-06	$(ug/m3)^{-1}$	3500	2.73E-02	(mg/kg)/day	A/leukemia	IRIS	7/7/00
Methylene chloride	4.7E-07	$(ug/m3)^{-1}$	3500	1.6E-03	(mg/kg)/day	B2/adenomas & carcinomas	IRIS	7/7/00
PCE	5.7E-07	$(ug/m3)^{-1}$	3500	2E-03	(mg/kg)/day	NA/liver	NCEA/ Region 9	11/29/99
TCE	1.1E-02	$(ug/m3)^{-1}$	3500	6E-03	(mg/kg)/day	NA	NCEA/ Region 9	11/29/99

NC - Not a carcinogen
IRIS: Integrated Risk Information System, U.S. EPA
NCEA: National Center for Environmental Assessment, U.S. EPA

A - Human carcinogen
B1 - Probable human carcinogen; limited human data are available
B2 - Probable human carcinogen; sufficient evidence in animals; inadequate or no evidence in humans
C - Possible human carcinogen
D - Not classifiable as a human carcinogen
E - Evidence of noncarcinogenicity

This table provides carcinogenic risk information for the contaminants of concern in groundwater. These values were used in the 2000 Risk Assessment. Acetone is not a carcinogen so cancer risks were not calculated for acetone. Also, at this time, slope factors are not available for the dermal route of exposure. Thus, the dermal slope factors used in the risk assessment were extrapolated from oral values. An adjustment factor is sometimes applied, and is dependent upon how well the chemical is absorbed via the oral route. Adjustments are particularly important for chemicals with less than 50% absorption via the ingestion route. However, adjustment was not necessary for the chemicals evaluated at the Evergreen Manor site and the dermal carcinogenic slope factor was assumed to be the same as the oral slope factor.

Inhalation slope factors for the chemicals of concern were calculated by multiplying the unit risk value, which is expressed in terms of $(ug/m3)^{-1}$ by (70 kg)/(20 m3/day)/(10^{-3}) to yield an inhalation slope factor in (mg/kg)/day.

Also, since the 2000 Risk Assessment, U.S. EPA reevaluated the cancer toxicity values for 2 of the chemicals - trichloroethene (TCE) and tetrachloroethene (PCE) - and currently recommends that the potential risks from these chemicals be evaluated using the most recent toxicity values. In 2003 U.S. EPA recalculated the potential risks for adult residential exposure to TCE and PCE in groundwater at the Evergreen Manor site using the currently recommend toxicity values and the concentrations of TCE and PCE detected in the groundwater in 2002. The updated toxicity information for these chemicals and the recalculated risks are shown in Table 6.

TABLE 4-b
Toxicity Data
Groundwater Exposure
2000 Risk Assessment

Noncancer Toxicity Data

Pathway: Ingestion, Dermal

Chemical	Chronic/ Subchronic	Oral RfD Value	Oral RfD Units	Dermal RfD	Dermal RfD Units	Primary Target Organ	Combined Uncertainty/ Modifying Factors	Sources of RfD/ Target Organ	Date
Acetone	Subchronic	1E-01	mg/kg-day	1E-01	mg/kg-day	liver/ kidney	1000	IRIS	7/7/00
Benzene	NA	3E-03	mg/kg-day	3E-03	mg/kg-day	NA	NA	NCEA/ Region 9	11/29/99
Methylene chloride	Chronic	6E-02	mg/kg-day	6E-02	mg/kg-day	liver	100	IRIS	7/7/00
Tetrachloroethene	Subchronic	1E-02	mg/kg-day	1E-02	mg/kg-day	liver	1000	IRIS	7/7/00
Trichloroethene	NA	6E-03	mg/kg-day	6E-03	mg/kg-day	NA	NA	Withdrawn/ Region 9	11/29/99

Pathway: Inhalation

Chemical	Chronic/ Subchronic	Inhalation RfC	Units	Adjusted Inhalation RfD	Inhalation RfD Units	Primary Target Organ	Combined Uncertainty/ Modifying Factors	Sources of RfC/RfD/ Target Organ	Date
Acetone	Subchronic	NA	NA	1E-01	mg/kg-day	liver/kidney	1000	Route extrapolation	7/7/00
Benzene	NA	6E-3	ug/m3	1.7E-03	mg/kg-day	NA	NA	NCEA/ Region 9	7/7/00
Methylene chloride	NA	NA	NA	8.6E-01	mg/kg-day	NA	NA	HEAST/ Region 9	7/7/00
Tetrachloroethene	Subchronic	3.9E-01	ug/m3	1.1E-01	mg/kg-day	liver	1000	NCEA/ Region 9	11/29/99
Trichloroethene	NA	2.1E-02	ug/m3	6E-03	mg/kg-day	NA	NA	Route Extrapolation/ Region 9	11/29/99

NA - Not available
IRIS: Integrated Risk Information System, U.S. EPA
NCEA: National Center for Environmental Assessment, U.S. EPA
HEAST: Health Effects Assessment Summary Tables

This table provides noncarcinogenic risk information for the contaminants of concern in groundwater. These values were used in the 2000 Risk Assessment. Dermal RfDs can be extrapolated from oral RfDs by applying an adjustment factor as appropriate. However, no adjustment was necessary for the chemicals at the Evergreen Manor site.

TABLE 5-a
Risk Characterization Summary
Exposure to Groundwater
2000 Risk Assessment

Carcinogens - Reasonable Maximum Exposure

Exposure Point	Chemical	Adult Cancer Risk				Child Cancer Risk			
		Ingestion	Dermal Contact	Inhalation of Volatiles	Exposure Routes Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Exposure Routes Total
Tap water	Acetone	-	-	-	-	-	-	-	-
	Benzene	3.1 x 10-7	4.3 x 10-8	5.8 x 10-7	9.3 x 10-7	1.8 x 10-7	1.9 x 10-8	3.9 x 10-7	5.9 x 10-7
	Methylene chloride	3.5 x 10-8	1.1 x 10-9	2.8 x 10-8	6.4 x 10-8	2.1 x 10-8	4.6 x 10-10	1.9 x 10-8	4.0 x 10-8
	PCE	4.4 x 10-6	1.4 x 10-6	6.3 x 10-7	6.4 x 10-6	2.6 x 10-6	6.1 x 10-7	4.3 x 10-7	3.6 x 10-6
	TCE	6.2 x 10-7	6.6 x 10-8	1.3 x 10-6	2.0 x 10-6	3.6 x 10-7	2.9 x 10-8	8.6 x 10-7	1.2 x 10-6
	Total	5.4 x 10-6	1.5 x 10-6	2.5 x 10-6	**9.4 x 10-6**	3.2 x 10-6	6.6 x 10-7	1.7 x 10-6	**5.5 x 10-6**

This table provides cancer risk estimates for exposure to groundwater calculated in the 2000 Risk Assessment. These risk estimates are based on a reasonable maximum exposure and were developed by taking into account various conservative assumptions about the frequency and duration of an adult's and child's exposure to groundwater, as well as the toxicity of the chemicals. For carcinogens, risks are generally expressed as the incremental probability of an individual's developing cancer over a lifetime as a result of exposure to the carcinogen. Excess lifetime cancer risk is calculated from the following equation: Risk = CDI X SF

where: Risk = a unitless probability (e.g., 2 x 10-5 of an individual's developing cancer
CDI = chronic daily intake averaged over 70 years (mg/kg-day)
SF = slope factor, expressed as (mg/kg-day)-1.

These risks are probabilities that are usually expressed in scientific notation (e.g., 1 x 10-6). An excess lifetime cancer risk of 1 x 10-6 indicates that an individual experiencing the reasonable maximum exposure estimate has a 1 in 1 million chance of developing cancer as a result of site-related exposure. This is referred to as an "excess lifetime cancer risk" because it would be in addition to the cancer risks people face from other causes such as smoking or exposure to too much sun. The chance of an individual developing cancer in general is estimated to be as high as 1 in 3. U.S. EPA's generally acceptable risk range for site-related exposures is 1 x 10-4 to 1 x 10-6.

The total excess lifetime risk estimated for exposure to groundwater at the Evergreen Manor site in the 2000 Risk Assessment is 9.4 x 10-6 for adults and 5.5 x 10-6 for children. The main chemicals posing these risks are TCE and PCE. These risks are within U.S. EPA's generally acceptable risk range of 1 x 10-4 to 1 x 10-6. However, in 2003 U.S. EPA recalculated the cancer risks for adult residential exposure to TCE and PCE using U.S. EPA's currently recommended toxicity values for these chemicals and the concentrations of TCE and PCE detected in the groundwater in 2002. The recalculated risks for adult exposure to TCE and PCE are shown in Table 6-b. U.S. EPA did not recalculate the risks for child exposure to groundwater since these risks would be less than those calculated under an adult exposure scenario.

TABLE 5-b
Risk Characterization Summary
Exposure to Groundwater
2000 Risk Assessment

Noncarcinogens - Reasonable Maximum Exposure

Exposure Point	Chemical	Adult Noncancer Hazard Quotient				Child Noncancer Hazard Quotient			
		Ingestion	Dermal Contact	Inhalation of Volatiles	Exposure Routes Total	Ingestion	Dermal Contact	Inhalation of Volatiles	Exposure Routes Total
Tap water	Acetone	2.7E-2	1E-4	1E-1	1.3E-1	6.4E-2	1.8E-4	2.8E-1	3.4E-1
	Benzene	5.5E-3	7.7E-4	3.6E-2	4.2E-2	1.3E-2	1.3E-3	9.8E-2	1.1E-1
	Methylene chloride	2.3E-4	6.9E-6	6E-5	3E-4	5.3E-4	1.2E-5	1.6E-4	7.0E-4
	PCE	2.5E-2	7.9E-3	8.4E-3	4.1E-2	5.8E-2	1.4E-2	2.3E-2	9.5E-2
	TCE	2.7E-2	2.9E-3	1E-1	1.3E-1	6.4E-2	5.1E-3	2.8E-1	3.5E-1
	Total Hazard Index	8.5E-2	1.2E-2	2.4E-1	**0.34**	2.0E-1	2.1E-2	6.8E-1	**0.9**

This table provides noncancer hazard quotients for each route of exposure and the hazard index (the sum of all hazard quotients) for all routes of exposure to groundwater calculated in the 2000 Risk Assessment. The potential for noncarcinogenic effects is evaluated by comparing an exposure level over a specified time period (e.g., lifetime) with a reference dose (RfD) derived for a similar exposure period. An RfD represents a level that an individual may be exposed to that is not expected to cause any harmful effects. The ratio of exposure to toxicity is called a hazard quotient. A hazard quotient <1 indicates that a person's dose of a single contaminant is less than the RfD and that toxic noncarcinogenic effects from that chemical are unlikely. The hazard index is calculated by adding the hazard quotients for all chemicals of concern for all routes through which an individual may reasonably be exposed. A hazard index < 1 indicates that, based on the sum of all hazard quotients from all contaminants and exposure routes, toxic noncarcinogenic effects are unlikely. A hazard index > 1 indicates that site-related exposures may pose a risk to human health.

Hazard quotients are calculated as follows: Noncancer hazard quotient = CDI/RfD

where: CDI = chronic daily intake
RfD = reference dose.

CDIs and RfDs are expressed in the same units and represent the same exposure period (i.e., chronic, subchronic or short-term).

The total noncancer hazard index estimated for exposure to groundwater at the Evergreen Manor site in the 2000 Risk Assessment is 0.34 for adults and 0.9 for children. The 2 chemicals contributing the most to the hazard index are acetone and TCE. These noncancer hazard indices of < 1 indicate that the intake of chemicals would be less than the amounts expected to cause adverse health effects, and that toxic noncarcinogenic effects from adult and child exposure to groundwater are unlikely.

TABLE 6-a
Revised Cancer Toxicity Data for TCE and PCE

Pathway: Ingestion, Dermal

Chemical	Oral Cancer Slope Factor	Dermal Cancer Slope Factor	Slope Factor Units	Weight of Evidence/ Cancer Guideline Description	Source	Date
PCE	5.4E-01	5.4E-01	(mg/kg)/day	NA/liver	OSWER Directive No. 9285.7-75	6/12/03
TCE	4.1E-01	4.1E-01	(mg/kg)/day	NA	U.S. EPA Superfund Health Risk Technical Support Center	7/15/03

Pathway: Inhalation

Chemical	Unit Risk	Units	Adjustment	Inhalation Cancer Slope Factor	Units	Weight of Evidence/ Cancer Guideline Description	Source	Date
PCE	5.9E-06	$(ug/m3)^{-1}$	3500	2..07E-02	(mg/kg)/day	NA/liver	OSWER Directive No. 9285.7-75	6/12/03
TCE	-	-	-	4E-01	(mg/kg)/day	NA	U.S. EPA Superfund Health Risk Technical Support Center	7/15/03

NA - Not applicable
OSWER - U.S. EPA Office of Solid Waste and Emergency Response

A - Human carcinogen
B1 - Probable human carcinogen; limited human data are available
B2 - Probable human carcinogen; sufficient evidence in animals; inadequate or no evidence in humans
C - Possible human carcinogen
D - Not classifiable as a human carcinogen
E - Evidence of noncarcinogenicity

TABLE 6-b
Recalculated TCE and PCE Cancer Risks
Adult Exposure to Groundwater

Recalculated Using Revised Toxicity Values for TCE and PCE and 2002 Groundwater Concentrations

Exposure Point	Chemical	Adult Cancer Risk			
		Ingestion	Dermal Contact	Inhalation of Volatiles	Exposure Routes Total
Tap water	PCE	3 x 10-5	1.2 x 10-5	4.3 x 10-6	4.6 x 10-5
	TCE	2.8 x 10-5	3.8 x 10-6	1 x 10-4	1.3 x 10-4
	Total	6 x 10-5	1.6 x 10-5	1.2 x 10-4	**2 x 10-4**

See Table 5-a for an explanation of carcinogenic risk calculations. Using the revised cancer toxicity data for TCE and PCE and the maximum concentrations of these chemicals detected in the groundwater in 2002 (7.9 ug/l for TCE and 5.9 ug/l for PCE) yields an excess lifetime cancer risk of 2 x 10-4 for exposure to groundwater under an adult residential scenario. This risk is slightly above U.S. EPA's generally acceptable risk range of 1 x 10-4 to 1 x 10-6 (1 additional case of cancer for every 10,000 to 1 million people similarly exposed). U.S. EPA did not recalculate the risks for child exposure to groundwater since these risks would be less than those calculated for adults.

TABLE 7-a
Soil Gas and Indoor Air Concentrations Analysis for Chemical Vapors Above Screening Levels

Home A

Chemical	Maximum Concentration in Soil Gas (ug/m3)	Indoor Air Concentrations (ug/m3)		Could Chemical Be Site-Related?	Explanation	Chemical Included in Risk Evaluation for Home?
		Basement	1st Floor			
Benzene	31	1.1	0.72	YES	Maximum soil gas concentration 27 times higher than indoor air concentrations. Unattached garage. One smoker but smoking not permitted in the house.	YES
Ethyl benzene	41	1.0	0.48	YES	Maximum soil gas concentration 40 times higher than indoor air concentrations. Unattached garage. One smoker but smoking not permitted in the house.	YES
Methylene chloride	0.9	27	2.40	INSIGNIFICANT AMOUNT	Indoor air concentrations 30 times higher than soil gas concentrations. Paints, polishes, cleaners, lubricants, etc. stored in basement. Basement concentration 11 times higher than 1st floor concentration.	NO
PCE	0.88	0.7	0.7	PARTLY	PCE was detected in soil gas and was detected in soil gas at higher levels (4.41 and 190 ug/l) at 2 other homes. However, soil gas and indoor air concentrations are similar and PCE was detected in ambient air sample (collected from Area C) at a risk of 7.8 x 10-7. Paints, polishes, cleaners, lubricants, etc., stored in basement.	YES
TCE	ND	ND	ND	ND	Not detected.	NA

ND - Not detected
NA - Not applicable; chemical not detected in indoor air.

SUMMARY: Benzene, ethyl benzene and tetrachloroethene considered site-related and included in risk evaluation. Methylene chloride considered household-related and not included in risk evaluation. Trichloroethene not detected.

TABLE 7-b
Soil Gas and Indoor Air Concentrations Analysis for Chemical Vapors Above Screening Levels

Home B

Chemical	Maximum Concentration in Soil Gas (ug/m3)	Indoor Air Concentrations (ug/m3)		Could Chemical Be Site-Related?	Explanation	Chemical Included in Indoor Air Risk Evaluation for Home?
		Basement	1st Floor			
Benzene	5.3	2.9	7	PARTLY	Benzene was detected in soil gas and was at high levels in soil gas (24.9 and 30.7 ug/m3) at 2 other homes. However, soil gas and indoor air concentrations are similar. Residents park in attached garage and have 3 5-gallon containers containing petroleum products. Not certain if containers removed prior to sampling. 1 or more smokers in home but smoking not permitted in house. Benzene concentrations 2.5x's higher on 1st floor where door to garage is than in basement.	YES - Basement Concentrations
Ethyl benzene	8.9	5.9	13	PARTLY	Ethyl benzene was detected in soil gas and was detected at high levels (40.4 and 17.8 ug/m3) in soil gas at 2 other homes. However, soil gas and indoor air concentrations are similar. Residents park in attached garage and have 3 5-gallon containers containing petroleum products. Not certain if containers removed prior to sampling. 1 or more smokers in home but smoking not permitted in house. Ethyl benzene concentrations 2x's higher on 1st floor where door to garage is than in basement.	YES - Basement Concentrations
Methylene chloride	0.8	99	28	INSIGNIFICANT AMOUNT	Indoor air concentrations 120 times higher than soil gas concentrations. Paints, polishes, cleaners, lubricants, paint removers, spot removers, etc. stored in basement. Methylene concentrations 3.5 times higher in basement than 1st floor.	NO
PCE	4.4	11	3.4	PARTLY	PCE was detected in soil gas and was detected at high levels (190 ug/m3) in soil gas at 1 other home. However, indoor air concentrations are 2 times higher than soil gas concentrations. Paints, polishes, cleaners, lubricants, paint removers, spot removers, etc., stored in basement. Not clear what amount of PCE is household related and what amount could be site-related. Included in risk assessment.	YES
TCE	ND	ND	ND	YES	Detected at low levels in soil gas but not in indoor air. TCE not detected in ambient air sample (collected from Area C).	NA

ND - Not detected
NA - Not applicable; chemical not detected in indoor air.

SUMMARY: Some benzene and ethyl benzene from 1st floor garage. Basement concentrations used in risk evaluation . Methylene chloride mostly house-hold related and not included in risk assessment. Some PCE house-hold related but amount is not clear so included in risk evaluation. TCE considered site-related.

TABLE 7-c
Soil Gas and Indoor Air Concentrations Analysis for Chemical Vapors Above Screening Levels

Home C

Chemical	Maximum Concentration in Soil Gas (ug/m3)	Indoor Air Concentrations (ug/m3)		Could Indoor Vapors Be Site-Related?	Explanation	Chemical Included in Indoor Air Risk Evaluation for Home?
		Basement	1st Floor			
Benzene	25	0.76	0.84	YES	Soil gas concentration 30 times higher than indoor air concentrations. Unattached garage. No smokers. Paints and other products stored in unattached garage	YES
Ethyl benzene	18	0.6	0.8	YES	Soil gas concentration 23 times higher than indoor air concentrations. Unattached garage. No smokers. Paints and other products stored in unattached garage.	YES
Methylene chloride	0.98	ND	0.88	PARTLY	Methylene chloride was detected in soil gas. However, methylene chloride was not detected in the basement, and soil gas and indoor air concentrations are similar. Paints etc., stored in basement. Methylene Chloride not detected in ambient air sample (collected from Area C).	YES
PCE	190	3.2	0.76	YES	Soil gas concentration 60 times higher than indoor air concentrations. Paints and other products stored in unattached garage.	YES
TCE	9.5	ND	ND	YES	Detected in soil gas but not in indoor air.	NA

ND - Not detected
NA - Not applicable; chemical not detected in indoor air.

SUMMARY: Benzene, ethyl benzene and PCE included in the indoor air risk evaluation. Some methylene chloride may be household related but amount is not clear. Methylene chloride included in indoor air risk evaluation. TCE found in soil gas but not in indoor air.

TABLE 7-d
Soil Gas and Indoor Air Concentrations Analysis for Chemical Vapors Above Screening Levels

Home D

Chemical	Maximum Concentration in Soil Gas (ug/m3)	Indoor Air Concentrations (ug/m3)		Could Indoor Vapors Be Site-Related?	Explanation	Chemical Included in Indoor Air Risk Evaluation for Home?
		Basement	1st Floor			
Benzene	1.6	9.3	22	INSIGNIFICANT AMOUNT	Indoor air concentration s 13 times higher than soil gas concentrations. Residents park in attached garage and have 2 to 3 containers containing petroleum products. Not certain if containers removed prior to sampling. Leaf blower stored in garage. Benzene concentrations 2 times higher on 1st floor where door to garage is than in basement.	NO
Ethyl benzene	1.9	4.8	8.1	INSIGNIFICANT AMOUNT	Ethyl benzene was detected in soil gas. However, indoor air concentrations are 4 times higher than soil gas concentrations. Residents park in attached garage and have 3 5-gallon containers containing petroleum products. Not certain if containers removed prior to sampling. Ethyl benzene concentrations about 1.5 times higher on 1st floor where door to garage is than in basement.	NO
Methylene chloride	0.74	1	1.3	PARTLY	Methylene chloride was detected in soil gas. However, soil gas and indoor air concentrations are similar. Paints etc., stored in basement. Methylene Chloride not detected in ambient air sample (collected from Area C).	YES
PCE	0.94	0.82	1.3	PARTLY	PCE was detected in soil gas and was detected in soil gas at higher levels (4.41 and 190 ug/m3) at 2 other homes. However, soil gas and indoor air concentrations are similar and PCE was also detected in ambient air sample (collected from Area C) at risk of 7.8 x 10-7. Paints, etc., are also stored in basement.	YES
TCE	1.4	ND	ND	YES	Detected at low levels in soil gas but not in indoor air. Not detected in ambient air sample (collected from Area C).	NA

ND - Not detected
NA - Not applicable; chemical not detected in indoor air.

SUMMARY: Benzene and ethyl benzene mostly household-related and not included in indoor air risk evaluation. Methylene chloride and PCE may be partly site-related but amount is not clear. These chemicals were included in the indoor air risk evaluation. TCE found in soil gas but not in indoor air.

TABLE 8-a
Risk Characterization Summary
Soil Vapor and Indoor Air

Carcinogenic Risks

Exposure Point	Chemical	Cancer Risk - 6 Years Child/24 Years Adult							
		Soil Gas				Indoor Air			
		Home A	Home B	Home C	Home D	Home A	Home B	Home C	Home D
	Benzene	1.3 x 10-5	2.3 x 10-6	1.1 x 10-5	7.7 x 10-7	4.8 x 10-6	1.3 x 10-5 (B)	3.7 x 10-6	INSF
	Ethyl benzene	2.4 x 10-6	5.2 x 10-7	1.1 x 10-6	1.1 x 10-7	5.9 x 10-7	3.5 x 10-6 (B)	4.7 x 10-7	INSF
	Methylene chloride	2.2 x 10-8	2 x 10-8	2.4 x 10-8	1.8 x 10-8	INSF	INSF	2.1 x 10-7	3.2 x 10-7
	PCE	1.3 x 10-7	6.6 x 10-7	2.8 x 10-5	1.4 x 10-7	1 x 10-6	1.6 x 10-5	4.8 x 10-6	1.9 x 10-6
	TCE	ND	3.1 x 10-6	5.6 x 10-5	8.2 x 10-6	ND	ND	ND	ND
	Total Cancer Risk	**1.6 x 10-5**	**6.6 x 10-6**	**9.6 x 10-5**	**9.2 x 10-6**	**6 .4 x 10-6**	**3.3 x 10-5**	**9.1 x 10-6**	**2.3 x 10-6**

ND Not detected
(B) Cancer risk calculated using basement concentration.
INSF Chemical mostly household related. Risks from site-related vapors insignificant. Chemical concentrations not included in risk evaluation.

See Table 5-a for an explanation of cancer risk calculations. Risks calculated using maximum concentrations unless otherwise noted. No noncancer risks identified .

TABLE 8-b
Risk Characterization Summary
Soil Vapor and Indoor Air

Noncarcinogenic Risks

Exposure Point	Chemical	Noncancer Hazard Quotient - 6 Years Child/24 Years Adult							
		Soil Gas				Indoor Air			
		Home A	Home B	Home C	Home D	Home A	Home B	Home C	Home D
Indoor Air	1,1,1-Trichloroethane	3.5E-5	1.7E-4	5.2E-5	1.6E-4	2.3E-3	1.3E-3	3.2E-4	1.2E-4
	2-Butanone	5.1E-4	1.2E-3	1.6E-3	5.7E-4	2.3E-2	1.3E-2	2.9E-3	2.7E-2
	Acetone	8.4E-3	1.7E-2	7E-3	7.6E-3	0.11	9.5E-1	9.7E-2	0.32
	Benzene	0.5	8.5E-2	0.4	2.6E-2	0.18	0.47 (B)	0.14	INSF
	Ethyl benzene	3.7E-3	8.1E-4	1.6E-3	1.7E-4	9E-4	5E-3 (B)	7.3E-4	INSF
	Freon 113	1.6E-6	2.5E-6	1.7E-6	2.5E-6	1.5E-5	1.4E-5	1.5E-5	1.4E-5
	m,p-xylene	4.6E-2	1E-2	5.5E-2	2.4E-3	2.7E-2	0.24 (B)	1.5E-2	INSF
	Methylene chloride	2.9E-5	2.6E-5	3.2E-5	2.4E-5	INSF	INSF	2.8E-4	4.2E-4
	PCE	1.4E-4	7.1E-4	3.1E-2	1.5E-4	1E-3	1.8E-1	5.2E-3	2.1E-3
	Toluene	2.4E-2	5E-3	3.8E-2	9E-4	5E-2	0.11 (B)	2.8E-2	INSF
	TCE	ND	1.4E-3	2.6E-2	3.8E-3	ND	ND	ND	ND
	o-Xylene	2.3E-2	3.8E-3	1.9E-2	1.2E-3	9E-3	5E-2 (B)	5.8E-3	INSF
	Total Noncancer Hazard Index	**0.61**	**0.13**	**0.58**	**0.05**	**0.40**	**0.99**	**0.29**	**0.35**

ND Not detected
(B) Noncancer hazard index calculated using basement concentration.
INSF Chemical mostly household related. Risks from site-related vapors insignificant. Chemical concentrations not included in risk evaluation.

See Table 5-b for an explanation of noncancer risk calculations. Risks calculated using maximum concentrations unless otherwise noted. No noncancer risks identified .

TABLE 9
Risk Characterization Summary
Exposure to Sediment

Sediment In Rock River Within and Downstream of Groundwater Discharge Zone

Exposure Point	Chemical	Detected Concentrations (ug/kg)	Frequency of Detection	Maximum Concentration Location	Region 9 Risk-Based Concentration for Residential Soil (ug/kg)	Chemical Above Risk-Based Screening Value?
Sediment	2-Butanone	3	1/10	SD-04	7,300	NO
	Freon 113	2 - 8	2/10	SD-01	5,600	NO
	Toluene	4 - 17	2/10	SD-01	520,000	NO

Chemical concentrations are well below the risk-based U.S. EPA Region 9 Preliminary Remediation Goals for Residential Soils and are not expected to pose any unacceptable risks to human health.

TABLE 10
Ecological Risk Summary
Exposure to Sediment

Sediment In Rock River Within and Downstream of Groundwater Discharge Zone

Exposure Point	Chemical	Detected Concentrations (ug/kg)	Frequency of Detection	Maximum Concentration Location	Lowest U.S. EPA Ecotox Threshold (ug/kg)	Most Conservative Canadian Sediment Criteria/Benchmark for Aquatic Life (ug/kg)	Chemical Above Ecological Screening Values?
Sediment	2-Butanone	3	1/10	SD-04	NE	NE	NO
	Freon 113	2 - 8	2/10	SD-01	NE	NE	NO
	Toluene	4 - 17	2/10	SD-01	670	890	NO

NE - Not established

Chemical concentrations are well below the lowest available sediment thresholds. Toxicological data are not available to evaluate the low levels of 2-butanone and Freon 113. However, the Screening Ecological Assessment conducted during the RI indicates a negligible potential for adverse effects on aquatic organisms in the Rock River from site-related chemicals.

TABLE 11
Ecological Risk Summary
Groundwater Discharge to Rock River

Residential Wells and Groundwater Samples

Chemical	Detected Concentrations (ug/l)	Frequency of Detection (1)	Maximum Concentration Location	Lowest U.S. EPA Ecotox Threshold (ug/l)	Most Conservative Canadian Freshwater Criteria/ Benchmark for Aquatic Life (ug/l)	Groundwater Concentration Above Ecological Screening Values?
1,1,1-Trichloroethane	0.29 - 5	18/44	RW-07	62	35	NO
1,1-Dichloroethane	0.19 - 2	4/44	CPT-11	47	NE	NO
1,1-Dichloroethene	0.16 - 0.2	1/44	MW-03	NE	11,600	NO
2-Butanone	16	1/44	CPT-05	NE	7,200	NO
Acetone	0.6 - 470	13/44	CPT-02	NE	NE	NO
Benzene	0.5 - 0.6	2/44	CPT-09	46	5.9	NO
Cis-1,2-Dichloroethene	0.39 - 2	4/44	RW-04, MW-105	NE	NE	NO
Ethyl benzene	0.6	1/44	CPT-09	290	8	NO
Freon 113	2 - 300	2/44	MW-103	NE	NE	NO
m- and/or p-xylene	0.5 - 0.7	3/44	CPT-06, CPT-09	1.8 *	2 *	NO
Methylene chloride	0.5	1/44	CPT-03	NE	98	NO
PCE	0.18 - 9	11/44	MW-103	120	5	YES
Toluene	0.5 - 3	19/44	CPT-11	130	0.8	YES
TCE	0.24 - 7.9	8/44	MW-03	350	1	YES
o-Xylene	0.6	2/44	CPT-02, CPT-11	NE	36	NO

NE - Not established
* - The value is for m-xylene
(1) Shallow and deep wells and multiple depths at CPT locations considered 1 location.

The maximum concentrations of PCE, toluene and TCE exceed the lowest available Canadian Environmental Quality Benchmarks for surface water (but are not above U.S. EPA Ecotox Thresholds). Because groundwater discharges to the Rock River, these and other site-related groundwater contaminants could pose a risk to the Rock River if they moved with the groundwater and emptied into the Rock River at levels that would threaten the river.

TABLE 12
Applicable or Relevant And Appropriate Requirements (ARARs)

- Safe Drinking Water Act (SDWA)
- Illinois Primary Drinking Water Standards (35 IAC Part 611)
- *Occupational Safety and Health Act* (OSHA)
- Resource Conservation and Recovery Act (RCRA) regulations for solid waste disposal and the generation and storage of hazardous waste (e.g., spent carbon)
- Clean Air Act (CAA)
- Clean Water Act (CWA)
- Illinois Effluent Standards (35 IAC Part 304)
- Illinois Permits and General Air Pollution Regulations (35 IAC Part 201).

TABLE 13
Cost Estimates

Costs	Alternative 1 No Further Action	Alternative 2 Groundwater Pump and Treat	Alternative 3 Monitored Natural Attenuation
Estimated Capital Cost	Minimal costs to abandon existing groundwater monitoring well network	$12.8 million	$1.8 million
Estimated Annual Operation and Maintenance (O&M) Costs Years 1 - 2 Years 3 - 5 Years 6 - 7 Years 8 - 10 Years 11 - 15	$0	$2.57 million $1.86 million $1.75 million $1.03 million *(Cleanup complete after year 8)*	$1.67 million $1 million $835,000 $127,000 $ 64,000
Estimated Present Worth	$0	$25.1 million	$8.5 million

Costs include a 25% contingency and a 7% discount rate.

The actual cost of the Groundwater Pump and Treat Alternative could be significantly less and would depend on the results of sampling conducted prior to designing the pump and treat system, as well as the results of the long-term monitoring.

The costs for the Monitored Natural Attenuation Alternative assume that groundwater monitoring will continue annually for 3 years after cleanup levels are attained. The actual cost of this alternative could also be significantly less and would depend on the results of sampling conducted prior to developing the long-term groundwater and vapor monitoring plans, as well as the results of the long-term monitoring.

TABLE 14
Cleanup Standards for Groundwater

Chemical	Cleanup Standard (1) (ug/l)	Basis of Cleanup Standard
Contaminants Detected in Groundwater and Residential Wells		
1,1,1-Trichloroethane	200	MCL
1,1-Dichloroethane	NE	MCL
1,1-Dichloroethene	7	MCL
2-Butanone	NE	MCL
Acetone	NE	MCL
Benzene	5	MCL
Cis-1,2-Dichloroethene	70	MCL
Ethyl benzene	700	MCL
Freon 113	NE	MCL
m,p-xylene	10,000 (total xylene)	MCL
Methylene chloride	5	MCL
PCE	5	MCL
Toluene	1,000	MCL
TCE	5	MCL
o-Xylene	10,000 (total xylene)	MCL
Other Breakdown Products of TCE and PCE That May Be Present in the Groundwater		
Trans-1,2-Dichloroethene	100	MCL
Vinyl Chloride	2	MCL

MCL - Maximum Contaminant Level established under the Safe Drinking Water Act.

(1) In addition to attaining MCLs, the groundwater must be restored to an aggregate cancer risk of 1 x 10-4 and a noncancer hazard index less than 1.0 at all points throughout the aquifer for adult and child ingestion, inhalation and dermal contact under a residential exposure scenario.

TABLE 15
Selected Remedy Cost Estimate

Estimated Capital Cost: $1.8 million

Estimated Annual Operation and Maintenance (O&M) Costs:

Year	Groundwater Monitoring	Residential Well Monitoring	Vapor Monitoring	All Monitoring
Years 1 - 2	$205,000	$71,000	$1.4 million	$1.67 million
Years 3 - 5	$205,000	$71,000	$726,000	$1 million
Years 6 - 7	$ 92,000	$35,000	$726,000	$835,000
Years 8 - 10	$ 92,000	$35,000	$0	$127,000
Years 11 - 15	$ 46,000	$18,000	$0	$64,000

Estimated Present Worth: $8.5 million

Costs include a 25% contingency and a 7% discount rate.

The costs for the Monitored Natural Attenuation Remedy assume that groundwater monitoring will continue annually for 3 years after cleanup levels are attained. The actual cost of the remedy may be significantly less and will depend on the results of sampling conducted prior to developing the long-term groundwater and vapor monitoring plans, as well as the results of the long-term monitoring.

APPENDIX A

Administrative Record File Index

7	11/17/98	Midwest Professional Reporting	U.S. EPA	Transcript of the November 17, 1998 Public Meeting re: the Evergreen Manor Ground-water Contamination Site	74
8	12/07/98	Christenson, S.; Ecolab, Inc.	Pope, J., U.S. EPA/	Letter re: Ecolab's Comments on the EE/CA for the Evergreen Manor Site	2

NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
9	03/02/99	Ribordy, M., U.S. EPA	Muno, W., U.S. EPA	Action Memorandum: Request for a Non-Time Critical CERCLA Removal Action and Consistency Exemption to the $2 Million and 12 Month Statutory Limit at the Evergreen Manor Site (Portions of this document have been redacted)	37
			UPDATE #2 APRIL 21, 1999		
1	03/19/99	U.S. EPA	Settling Parties	Administrative Order on Consent re: the Evergreen Manor Ground-water Contamination Site	29

U.S. ENVIRONMENTAL PROTECTION AGENCY

ADMINISTRATIVE RECORD
FOR
EVERGREEN MANOR GROUNDWATER CONTAMINATION SITE
ROSCOE, WINNEBAGO COUNTY, ILLINOIS

ORIGINAL
NOVEMBER 9, 1998

NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
1	07/00/92	IEPA	U.S. EPA	*CERCLA Screening Site Inspection Report* for the Evergreen Manor Groundwater Contamination Site	114
2	00/00/94	IEPA	U.S. EPA	*CERCLA Expanded Site Site Inspection Report* for the Evergreen Manor Groundwater Contamination Site	265
3	05/29/97	IEPA	U.S. EPA	Hazard Ranking System Documentation Record for the Evergreen Manor Groundwater Contamination Site	88
4	05/29/97	IEPA	U.S. EPA	Hazard Ranking System Documentation Record: References 1-14 for the Evergreen Manor Groundwater Contamination Site	430
5	05/29/97	IEPA	U.S. EPA	Hazard Ranking System Documentation Record: References 15-32 for the Evergreen Manor Groundwater Contamination Site (DOCUMENT HAS NOT BEEN COPIED FOR PHYSICAL INCLUSION INTO THE ADMINISTRATIVE RECORD: MAY BE VIEWED AT U.S. EPA REGION 5)	
6	11/00/98	U.S. EPA	Public	Fact Sheet: *U.S. EPA Evaluates Removal Options for the Evergreen Manor Groundwater Contamination Site*	10
7	11/10/98	U.S. EPA		*Engineering Evaluation/ Cost Analysis Report* for the Evergreen Manor	98

NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
			UPDATE #1 **FEBRUARY 26, 1999**		
1	01/00/97	Conestoga-Rovers & Associates	Ecolab, Inc.	Report: Contaminant Source Evaluation for the Evergreen Manor Site (SEE DOCUMENT #2, ATTACHMENT #11)	
2	01/31/97	Christenson, S.; Ecolab, Inc.	Eastep, L., IEPA and A. Hyderi, Office of Illinois Attorney General	Letter re: Ecolab's Response to IEPA's September 30, 1996 Notice Letter and Related Letters from the IAG Concerning the Evergreen Manor Site w/ Attachments #1-11	223
3	09/00/97	Conestoga-Rovers & Associates	Ecolab, Inc.	Groundwater Flow Analysis Report for the Evergreen Manor Site (SEE DOCUMENT #4, ENCLOSURE #2)	
4	09/22/97	Christenson, S.; Ecolab, Inc.	Wallace, E., Office of Illinois Attorney General	Letter re: Ecolab's Response to IAG's April 14, 1997 Letter Concerning the Super-fund Program and the Evergreen Manor Site w/ Attachments	38
5	10/09/98	Christenson, S.; Ecolab, Inc.	U.S. EPA/ CERCLA Docket Office	Letter re: Ecolab's Comments on the Proposed Listing of the Evergreen Manor Site on the National Priorities List	14
6	11/00/98	Concerned Citizens	U.S. EPA	Twenty-Five Public Comment Letters/Sheets Received November 13-December 10, 1998 on U.S. EPA's Proposed Cleanup Plan for the Evergreen Manor Site	25

U.S. ENVIRONMENTAL PROTECTION AGENCY
REMEDIAL ACTION

ADMINISTRATIVE RECORD
FOR
EVERGREEN MANOR GROUNDWATER CONTAMINATION SITE
ROSCOE, WINNEBAGO COUNTY, ILLINOIS

UPDATE #3
JULY 22, 2003

NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
1	10/07/77	Petrilli, J.	AAA Disposal System	Letter re: Completion of Closure Requirements at the AAA Disposal System Facility	2
2	11/09/87	Estes, L., Illinois EPA	Pearson, T., Regal Beloit Corporation	Letter re: Illinois EPA Approval of Hazardous Waste Storage Facility Closure Report for the Regal Beloit Corporation W/Attachments	62
3	11/01/95	Environmental Services	Waste Management of Wisconsin	104(e) Response Attachments for Waste Management of Wisconsin	292
4	04/00/00	Roy F. Weston, Inc.	U.S. EPA	Quality Assurance Project Plan for the Evergreen Manor Site	311
5	04/24/00	Roy F. Weston, Inc.	U.S. EPA	Health and Safety Plan for the Evergreen Manor Site	61
6	03/00/01	Roy F. Weston, Inc.	U.S. EPA	Remedial Investigation Report: Volume 1(Text, Tables, Figures and Appendices A-B)for the Evergreen Manor Site	248
7	03/00/01	Roy F. Weston, Inc.	U.S. EPA	Remedial Investigation Report: Volume 2 (Appendices C-F)for the Evergreen Manor Site	554
8	03/15/02	Bhojwani, D., Roy F. Weston, Inc.	Cibulskis, K., U.S. EPA	Letter re: Weston's Response to U.S. EPA's Comments on the Health and Safety Plan Amendment No. 1 and the Revised HASP Amendment No. 1 (Revision No. 1) for the Evergreen Manor Site	8
9	03/26/02	Roy F. Weston, Inc.	U.S. EPA	Quality Assurance Project Plan and Field Sampling Plan - Amendment No. 1 (Revision 2): for the Evergreen Manor Site	20

NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
10	04/01/02	Marouf, A., U.S. EPA	Cibulskis, K., U.S. EPA	E-Mail Transmission re: U.S. EPA's March 4, 2000 Comments on the Health and Safety Plan for the Evergreen Manor Site	1
11	05/22/02	Roy F. Weston, Inc.	U.S. EPA	Quality Assurance Project Plan - Amendment No. 2 (Revision 1): Air Sampling Activities at the Evergreen Manor Site	98
12	10/30/02	Roy F. Weston, Inc.	U.S. EPA	Quality Assurance Project Plan - Amendment No. 3 (Revision 3): Groundwater Vertical Sampling Activities at the Evergreen Manor Site	29
13	07/00/03	U.S. EPA	Public	Fact Sheet: EPA Proposes Cleanup Plan for Groundwater Contamination at the Evergreen Manor Site	8
14	07/00/03	Weston Solutions, Inc.	U.S. EPA	Feasibility Study Report for the Evergreen Manor Site	265
15	07/11/03	Weston Solutions, Inc.	U.S. EPA	Groundwater Data Evaluation Report (Revision 1-Redacted Version) for the Evergreen Manor Site	492
16	07/16/03	Weston Solutions, Inc.	U.S. EPA	Air Sampling Report (Revision 3 - Redacted Version) for the Evergreen Manor Site	319

U.S. ENVIRONMENTAL PROTECTION AGENCY
REMEDIAL ACTION

ADMINISTRATIVE RECORD
FOR
EVERGREEN MANOR GROUNDWATER CONTAMINATION SITE
ROSCOE, WINNEBAGO COUNTY, ILLINOIS

UPDATE #4
SEPTEMBER 30, 2003

NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
1	11/25/87	U.S. EPA	File	Potential Hazardous Waste Site Preliminary Assessment w/Map	2
2	08/00/01	U.S. EPA/ORD	U.S. EPA	Report: Trichloroethylene Health Risk Assessment: Synthesis and Characterization	151
3	02/00/03	U.S. EPA	Public	Fact Sheet: Indoor Air Sampling Results Available for the Evergreen Manor Site	4
4	06/12/03	Southerland, E., U.S. EPA	Baily, M., U.S. EPA	Letter re: Inquiries Concerning Toxicity Values to Evaluate Inhalation and Ingestion Risks from Exposure to Tetrachloroethylene w/Attachment	10
5	07/15/03	Parker, A., U.S. EPA/STSC	Vanleeuwen, P., U.S. EPA	E-Mail Transmission re: Toxicity Values for Trichloroethylene	1
6	07/25/03	U.S. EPA	*Register Star* Rockport, IL	Newspaper Advertisement: U.S. EPA Proposes a Final Cleanup Remedy and Announces an Availability Session, Public Meeting and Comment Period for the Evergreen Manor Site	1
7	08/00/03	U.S. EPA	File	Recalculated Cancer Risks for Adult Exposure to Groundwater	1
8	08/06/03	U.S. EPA	Public	News Release: Monitoring Plan for Evergreen Manor Ground Water Contamination Proposed: Public Meeting August 19, 7 P.M.	3
9	08/15/03	Roth, R., Winnebago County Health Department	Pope, J., U.S. EPA	Letter re: Proposed Clean-up Plan for Groundwater Contamination at the Evergreen Manor Site	1

NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
10	08/19/03	Elite Reporting Services	U.S. EPA	Transcript of August 19, 2003 Public Meeting on the Ground Water Contamination Proposal for the Evergreen Manor Site	63
11	08/19/03	Roscoe Residents	U.S. EPA	Public Comment Sheets: Comments on the Cleanup Option for the Remaining Groundwater Contamination at the Evergreen Manor Site	2
12	08/21/03	Salsbury, N., Roscoe Resident	Pope, J., U.S. EPA	E-Mail Transmission re: Comments on the Proposed Plan for the Evergreen Manor Site	1
13	08/26/03	Butts, D., Roscoe Resident	Pope, J., U.S. EPA	E-Mail Transmission re: Comments on the Proposed Plan for the Evergreen Manor Site	1
14	08/26/03	Mueller, F., Johnson & Bell, LTD.	Matson, J., U.S. EPA	Letter re: Confirmation of Telephone Conversation Responding to August 18, 2003 Letter (Extension of Evergreen Manor Public Comment Period	1
15	08/27/03	Ray, A., Roscoe Resident	Pope, J., U.S. EPA	E-Mail Transmission re: Questions and Comments on the Proposed Cleanup Plan for the Evergreen Manor Site	2
16	08/28/03	Rosencrance, K., Roscoe Resident	Pope, J., U.S. EPA	E-Mail Transmission re: Comments on the Proposed Plan for the Evergreen Manor Site	2
17	09/00/03	Conestoga-Rovers & Associates	U.S. EPA	Comments on the U.S. EPA's Proposed Cleanup Plan for Groundwater Contamination, Evergreen manor Site	46
18	09/17/03	Roth, R., Winnebago County Health Department	Cibulskis, K., U.S. EPA	E-Mail Transmission re: Well and Building Permits for the Evergreen Manor Site	1
19	09/24/03	Schneider, R., Quarles & Brady, LLP	Cibulskis, K., & J. Pope, U.S. EPA	Letter re: Comments of Waste Management on the Feasibility Study for the Evergreen Manor Ground Water Contamination Site	11

NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
20	09/25/03	U.S. EPA	Public	Newspaper Advertisement: U.S. EPA has Extended the Public Comment Period for the Evergreen Manor Site	1
21	09/25/03	Mueller, F., Johnson & Bell, LTD.	Pope, J., & K. Cibulskis, U.S. EPA	Letter re: Comments of Ecolab, Inc. on the U.S. EPA's Proposed Cleanup Plan for Groundwater Contamination at the Evergreen Manor Site	4

APPENDIX B

Groundwater Modeling Under Natural Conditions

is that groundwater discharges to the Rock River. Migration of contaminants could occur where groundwater discharges to surface water.

The results of the surface water sampling indicated that VOCs were not detected in the Rock River. This is most likely due to dilution that occurs when a relatively small volume of groundwater is discharged to the Rock River and is mixed with a relatively large volume of surface water.

Based on the relatively low COC concentrations detected at the site, and the large amount of dilution occurring, the groundwater to surface water migration pathway does not appear to be a concern at the Evergreen Manor site.

8.4 TRANSPORT MODELING

A modeling approach was taken to estimate the time for contaminants to decline to below screening levels. A simple groundwater model was used to simulate the transport of contaminants through the saturated subsurface. Based on the available data, an analytical model approach was determined to be applicable. The BIOSCREEN Natural Attenuation Decision Support System (Newell, 1996) was the model used to simulate contaminant transport.

8.4.1 BIOSCREEN

BIOSCREEN was written to support natural attenuation of hydrocarbons at petroleum sites, however, the transport code is equally applicable for other dissolved contaminants. The model takes into consideration advection, dispersion, adsorption, and biodegradation; however, since biodegradation could not be proved to be occurring at the Evergreen Manor site, based on RI analytical data, it was not incorporated into the model.

BIOSCREEN models a single contaminant originating from a source area with a known contaminant mass. The model uses a half-life approach to reducing the contaminant mass at the source. With a small source mass input, the model can be used to approximate a short term or nearly instantaneous

contaminant release. Although unknown, it is presumed that the release at the site can be modeled as short term or nearly instantaneous release.

The limitations of the BIOSCREEN model are that it assumes simple groundwater flow conditions, and only approximates more complicated processes. The sand and gravel aquifer underlying the Evergreen Manor site is assumed to be fairly homogeneous, and can be modeled as one continuous flow system. The distribution of chemical data at the Evergreen Manor site is more complex, and BIOSCREEN was used to provide approximations of contaminant concentrations.

BIOSCREEN can estimate concentration distributions either along the axis of a plume, or across the modeled area. To simplify the modeling approach, calibration data were assumed to be located along the axis of the plume, and only the output of concentration distributions along the axis of the plume were evaluated.

8.4.2 Input and Assumptions

Table 8-6 presents the input parameters used in each of the four models created. Since these parameters vary for each contaminant, a separate model was created for each one. The contaminants include chloroform, 1,1,1-TCA, TCE, and PCE.

Model Dimensions - Assuming that the contaminant source area is located in the area north of Rockton Road, and east of IL 251, the length of the plume (L_p) was set to be 13,000 feet. This is the straight line length to the presumed discharge area at the Rock River. A width of 2,500 feet was used, which is approximately twice the presumed width of the actual plume.

Source Concentration and Source Mass - Since a source has not been identified at the site, the source concentration and source mass were adjusted during modeling to fit the calibration data. These values were altered for each compound.

Hydraulic Conductivity - The value provided in Section 6 of this report is 3.8×10^{-2} cm/sec. This value is based on pressure tests, which are similar to slug tests in that they only approximate the

hydraulic conductivity of the aquifer volume in close proximity to the test well. It is possible that the volume of aquifer close to the borehole has been disturbed during well installation (Kruseman, 1990), or has differing hydraulic properties, and the resulting hydraulic conductivity could be underestimated. The hydraulic conductivity used in modeling was 2.2×10^{-1} cm/sec, which best fit the modeled concentrations to the available data and is a value within the range of hydraulic conductivities for the types of geologic materials found at the site.

Hydraulic Gradient - The value used, 0.0015 ft/ft, is based on the groundwater elevation data presented in Section 6.

Porosity - The value used, 30%, is a typical porosity for sand and gravel mixtures (Fetter, 1994).

Dispersion - For chloroform, 1,1,1-TCA, and TCE, longitudinal dispersivity (Alpha X) was set to 59.9 feet, and was calculated with the Xu and Eckstein (1995) equation:

$$AlphaX = 3.28 \cdot 0.83 \left[\log_{10}\left(\frac{L_p}{3.28}\right) \right]^{2.414}$$

This equation is based on the length of the plume, which equals 13,000 feet. The longitudinal dispersivity was set to 100 feet for the PCE model. Transverse dispersivity was set to one-tenth of the longitudinal dispersivity. Vertical dispersivity was anticipated to be negligible compared to longitudinal and transverse dispersion.

Retardation Factor - This was calculated using a soil bulk density (ρ_b)of 1.8 kg/L (IAC, 1997), a contaminant specific partition coefficient (K_{oc}), a fraction of organic carbon (f_{oc}) of either 0.06% or 0.2% (U.S. EPA, 1998b), and a porosity (n) of 30% in the following equations:

$$K_d = K_{oc} \cdot f_{oc} \qquad R_f = 1 + \frac{K_d \cdot \rho_b}{n}$$

where K_d is the contaminant-specific distribution coefficient. The partition coefficient values were obtained from Table 8-1 and from *Groundwater Chemicals Desk Reference* (Montgomery, 1989). Retardation factors of 1.5, 2.5, 2.1 and 2.0 were used for chloroform, 1,1,1-TCA, TCE, and PCE, respectively.

8.4.3 Calibration Data

The four contaminants modeled with BIOSCREEN included chloroform, 1,1,1-TCA, TCE, and PCE. Although concentrations of 1,1,1-TCA did not exceed screening levels, this contaminant was used in order to calibrate the model. Table 8-7 presents the data to which the models were calibrated. This table presents the concentrations from the HRS package and this RI, as well as the approximate distance from the source area. The HRS package data were collected about 5 to 6 years prior to the RI data. This time interval was also used to calibrate the models.

8.4.4 1,1,1-TCA and TCE

The 1,1,1- TCA and TCE models were calibrated to the data presented in Table 8-7 by altering the hydraulic conductivity, the source concentration, and the source mass. Several attempts were made to match the calibration data using a hydraulic conductivity value of 3.8×10^{-2} cm/sec, as presented in section 6-2, however, the calibration data could not be matched. As discussed previously, the hydraulic conductivity could have been underestimated. Therefore, the hydraulic conductivity was increased until the modeled contaminant distribution matched the calibration data, yet still resulted in using an acceptable value with regard to geologic conditions.

The source concentration and the source mass were adjusted in order to approximate the actual concentrations from the HRS package and this RI. Although an actual source concentration or mass are not known, values were chosen that fitted the available data. The resulting concentration distributions are presented in Appendix F.

The plots for 1,1,1-TCA indicate that the HRS package data and the RI data can be matched at 24 and 30 years respectively. These times do not represent the actual time since a release occurred, but

rather the time it took to match the calibration data. Thus, the 24 year output matches the HRS data, and the 30 year output matches the RI data. Similarly, the TCE concentrations were matched to the HRS package and RI data at model output at 20 and 26 years.

Simulations of TCE transport were run beyond the RI time frame to estimate when concentrations would decline below the screening level of 5 ug/L. This result was achieved from the 32 year simulation, or 6 years after the RI. Thus, in about 2006 TCE concentrations at the site are predicted to be below the screening level.

8.4.4 Chloroform

As shown on Table 8-7, only one data point exists for chloroform. Based on the calibrations performed for 1,1,1-TCA and TCE, a model for chloroform was created which matched the concentration at 11943 Wagon Lane during the RI. Only the adsorption, source concentration, and source mass values were adjusted to model chloroform transport. The result, presented in Appendix F, shows that after a simulated time of 15 years, the RI datum is matched.

The simulation was run beyond the 15 years to estimate when the chloroform concentration would decline below the screening level of 0.02 ug/L. This result was achieved with the 18 year simulation, or 3 years after the RI. Thus, chloroform concentrations at the site are predicted to be below the screening level in 2003.

8.4.5 PCE

The PCE model was created by matching three calibration data points from the RI. Dispersion, adsorption, source concentration, and source mass values were adjusted to model PCE transport. The model output at 15 years corresponds to the data collected during the RI. This result is presented as part of Appendix F.

The simulation was run beyond the 15 years to estimate when PCE concentrations would fall below the screening level, 5 ug/L. The 30 year simulation was found to meet this goal. Thus, about 15

years after the RI, in 2015, PCE concentrations at the site are predicted to be below the screening level.

BIOSCREEN Natural Attenuation Decision Support System

Air Force Center for Environmental Excellence — *Version 1.4*

Evergreen Manor
111TCA
Run Name

Data Input Instructions:

115 or 0.02 — 1. Enter value directly....or 2. Calculate by filling in grey cells below. (To restore formulas, hit button below).

Variable* — Data used directly in model.
20 — Value calculated by model. (Don't enter any data).

1. HYDROGEOLOGY

Seepage Velocity*	Vs	1138.1	(ft/yr)
or		or	
Hydraulic Conductivity	K	2.2E-01	(cm/sec)
Hydraulic Gradient	I	0.0015	(ft/ft)
Porosity	n	0.3	(-)

2. DISPERSION

Longitudinal Dispersivity*	alpha x	59.9	(ft)
Transverse Dispersivity*	alpha y	6.0	(ft)
Vertical Dispersivity*	alpha z	0.0	(ft)
or		or	
Estimated Plume Length	Lp	13000	(ft)

3. ADSORPTION

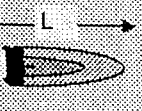
Retardation Factor*	R	2.5	(-)
or		or	
Soil Bulk Density	rho	1.8	(kg/l)
Partition Coefficient	Koc	126.9	(L/kg)
FractionOrganicCarbon	foc	2.0E-3	(-)

4. BIODEGRADATION

1st Order Decay Coeff*	lambda	0.0E+0	(per yr)
or		or	
Solute Half-Life	t-half		(year)
or Instantaneous Reaction Model			
Delta Oxygen*	DO		(mg/L)
Delta Nitrate*	NO3		(mg/L)
Observed Ferrous Iron*	Fe2+		(mg/L)
Delta Sulfate*	SO4		(mg/L)
Observed Methane*	CH4		(mg/L)

5. GENERAL

Modeled Area Length*	13000	(ft)
Modeled Area Width*	2500	(ft)
Simulation Time*	24	(yr)



6. SOURCE DATA

Source Thickness in Sat Zone* 40 (ft)

Source Zones:

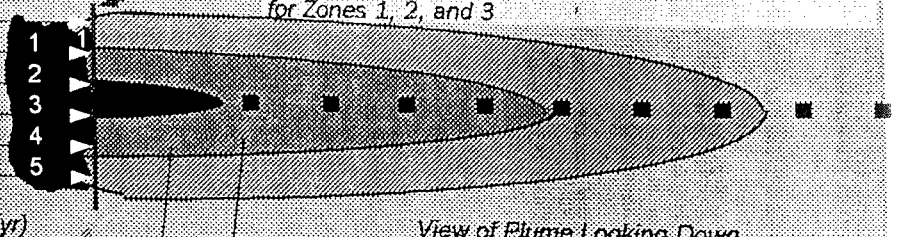
	Width* (ft)	Conc. (mg/L)*
1		
2		
3	500	0.045
4	0	0
5	0	0

Source Halflife (see Help):

Inst. React.	1st Order	
3	3	(yr)
Soluble Mass	35	(Kg)

In Source NAPL, Soil

Vertical Plane Source: Look at Plume Cross-Section and Input Concentrations & Widths for Zones 1, 2, and 3



View of Plume Looking Down

7. FIELD DATA FOR COMPARISON

Observed Centerline Concentrations at Monitoring Wells
If No Data Leave Blank or Enter "0"

Dist. from Source (ft)	Concentration (mg/L)
0	
1300	
2600	
3900	
5200	
6500	
7800	
9100	.009
10400	.01
11700	
13000	

8. CHOOSE TYPE OF OUTPUT TO SEE:

RUN CENTERLINE — View Output

RUN ARRAY — View Output

Help

Recalculate This Sheet

Paste Example Dataset

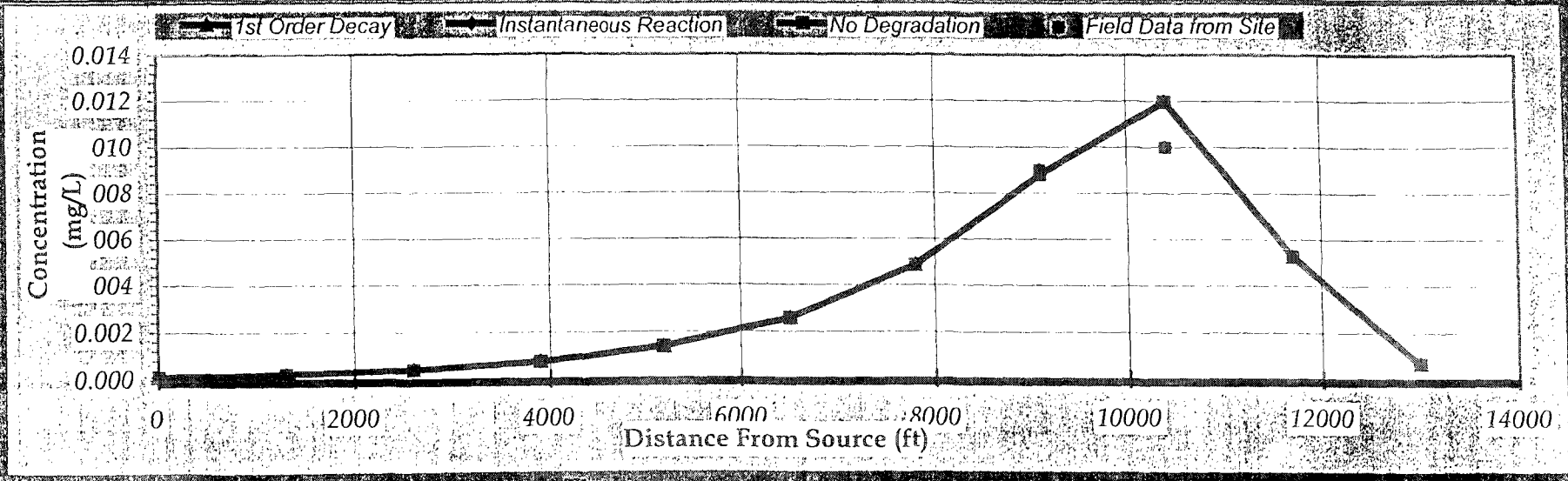
Restore Formulas for Vs, Dispersivities, R, lambda, other

1,1,1 TCA input parameters

DISSOLVED HYDROCARBON CONCENTRATION ALONG PLUME CENTERLINE (mg/L at Z=0)

Distance from Source (ft)

TYPE OF MODEL	0	1300	2600	3900	5200	6500	7800	9100	10400	11700	13000
No Degradation	0.000	0.000	0.000	0.001	0.001	0.003	0.005	0.009	0.012	0.005	0.001
1st Order Decay	0.000	0.000	0.000	0.001	0.001	0.003	0.005	0.009	0.012	0.005	0.001
Inst. Reaction	0.000	0.000	0.000	0.001	0.001	0.003	0.005	0.009	0.012	0.005	0.001
Field Data from Site								0.009	0.010		



Calculate Animation

Time

24 Years

Return to Input

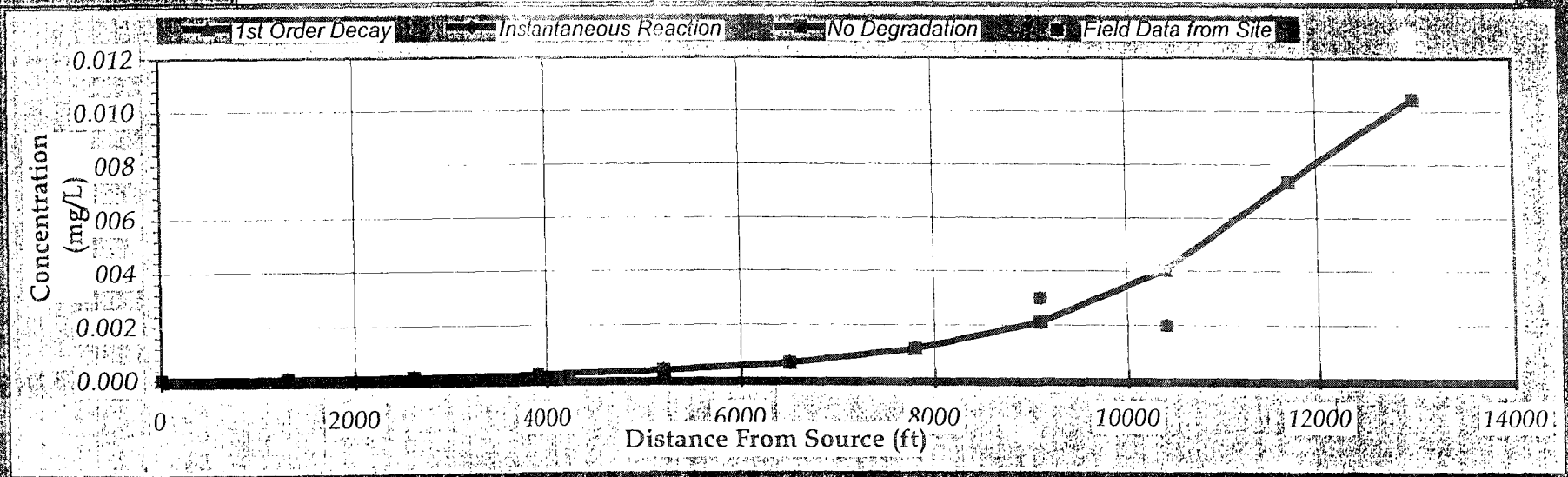
Recalculate This Sheet

1,1,1-TCA - Matched to HRS data (simulation time=24 years)

DISSOLVED HYDROCARBON CONCENTRATION ALONG PLUME CENTERLINE (mg/L, Z=0)

Distance from Source (ft)

TYPE OF MODEL	0	1300	2600	3900	5200	6500	7800	9100	10400	11700	13000
No Degradation	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.002	0.004	0.007	0.010
1st Order Decay	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.002	0.004	0.007	0.010
Inst. Reaction	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.002	0.004	0.007	0.010
Field Data from Site								0.003	0.002		



Calculate Animation

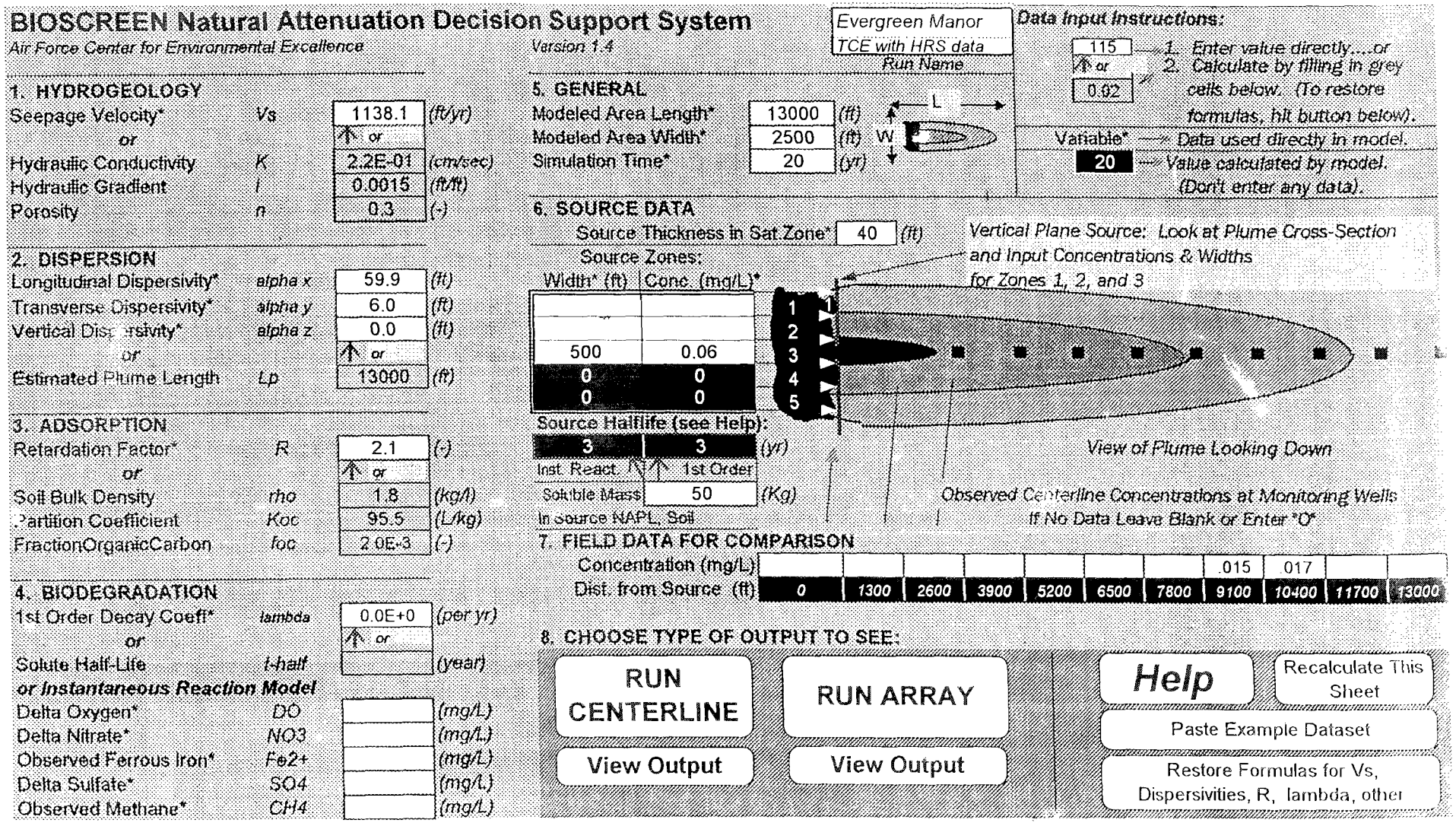
Time

30 Years

Return to Input

Recalculate This Sheet

1,1,1-TCA - Matched to RI data (simulation time=30 years)

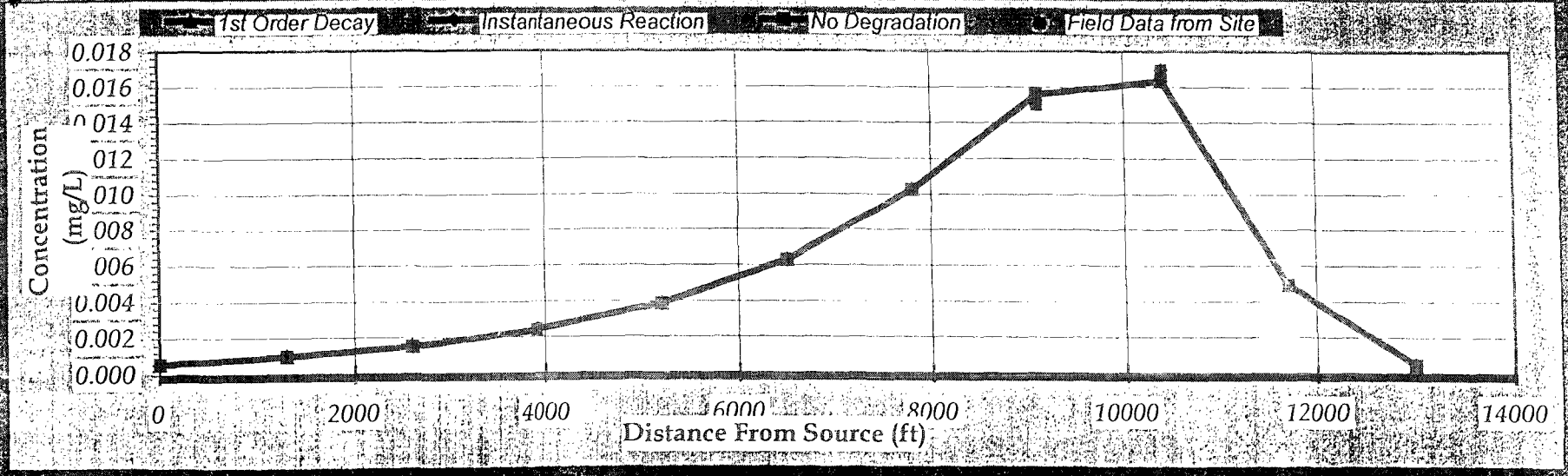


TCE input parameters

DISSOLVED [illegible] CONCENTRATION ALONG PLUME CENTERLINE (mg/L, Z=0)

Distance from Source (ft)

TYPE OF MODEL	0	1310	2600	3900	5200	6500	7800	9100	10400	[illegible]	13000
No Degradation	0.001	0.001	0.002	0.002	0.004	0.006	0.010	0.016	0.016	0.005	0.000
1st Order Decay	0.001	0.001	0.002	0.002	0.004	0.006	0.010	0.016	0.016	0.005	0.000
Inst. Reaction	0.001	0.001	0.002	0.002	0.004	0.006	0.010	0.016	0.016	0.005	0.000
Field Data from Site								0.015	0.017		



Time

20 Years

Calculate Animation

Return to Input

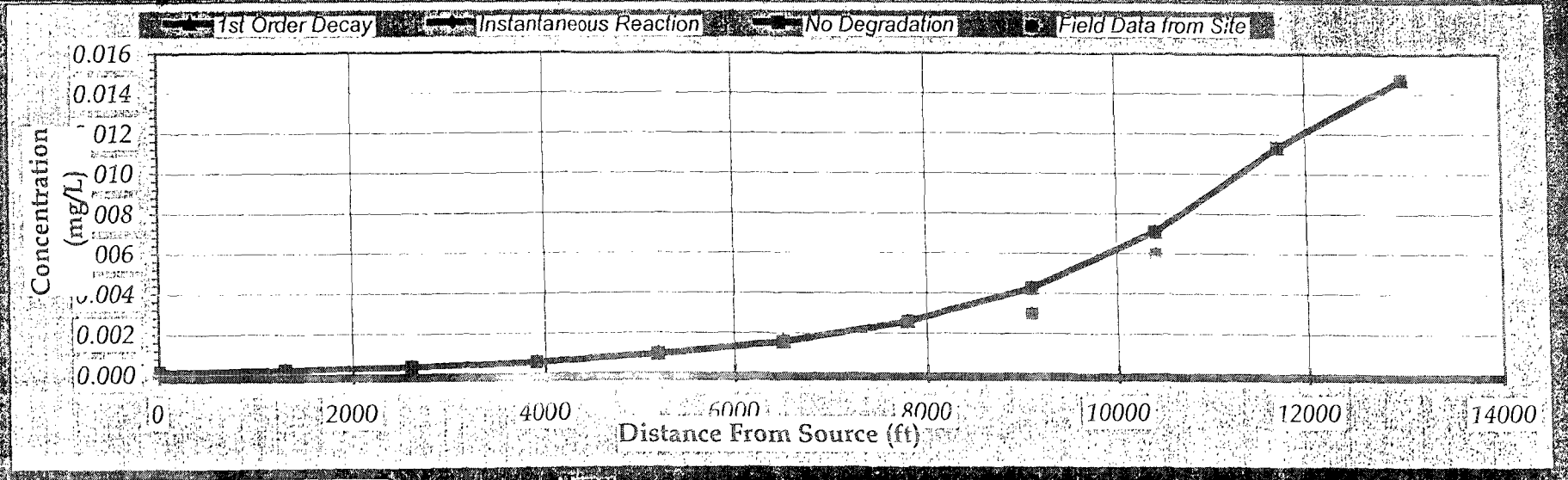
Recalculate This Sheet

TCE - Matched to the HRS data (simulation time = 20 years)

DISSOLVED HYDROCARBON CONCENTRATION ALONG PLUME CENTERLINE (mg/L @ Z = 0)

Distance from Source (ft)

TYPE OF MODEL	0	1300	2600	3900	5200	6500	7800	9100	10400	11700	13000
No Degradation	0.000	0.000	0.000	0.001	0.001	0.002	0.003	0.004	0.007	0.011	0.015
1st Order Decay	0.000	0.000	0.000	0.001	0.001	0.002	0.003	0.004	0.007	0.011	0.015
Inst. Reaction	0.000	0.000	0.000	0.001	0.001	0.002	0.003	0.004	0.007	0.011	0.015
Field Data from Site								0.003	0.006		



Time:

26 Years

Calculate Animation

Return to Input

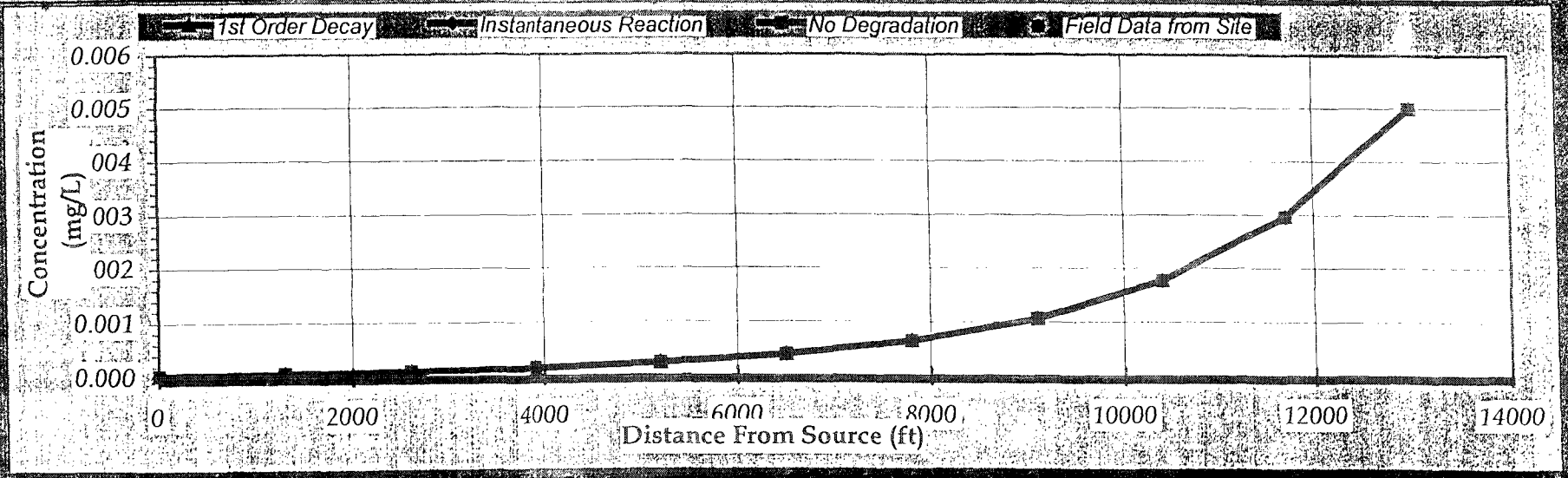
Recalculate This Sheet

TCE - Matched to the RI data (simulation time = 26 years)

DISSOLVED HYDROCARBON CONCENTRATION ALONG PLUME CENTERLINE (mg/L at Z=0)

Distance from Source (ft)

TYPE OF MODEL	0	1300	2600	3900	5200	6500	7800	9100	10400	11700	13000
No Degradation	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.002	0.003	0.005
1st Order Decay	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.002	0.003	0.005
Inst. Reaction	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.002	0.003	0.005
Field Data from Site											



Calculate Animation

Time
32 Years

Return to Input

Recalculate This Sheet

TCE - Concentrations below screening level (5 ug/L; Simulation time = 32 years; 6 years after RI)

BIOSCREEN Natural Attenuation Decision Support System

Air Force Center for Environmental Excellence — *Version 1.4*

Evergreen Manor
Chloroform with HRS data

Data Input Instructions:
115 or 0.02 — 1. Enter value directly...or 2. Calculate by filling in grey cells below. (To restore formulas, hit button below).
Variable* — Data used directly in model.
20 — Value calculated by model. (Don't enter any data).

1. HYDROGEOLOGY

Seepage Velocity*	Vs	1138.1	(ft/yr)
or		or	
Hydraulic Conductivity	K	2.2E-01	(cm/sec)
Hydraulic Gradient	I	0.0015	(ft/ft)
Porosity	n	0.3	(-)

2. DISPERSION

Longitudinal Dispersivity*	alpha x	59.9	(ft)
Transverse Dispersivity*	alpha y	6.0	(ft)
Vertical Dispersivity*	alpha z	0.0	(ft)
or		or	
Estimated Plume Length	Lp	13000	(ft)

3. ADSORPTION

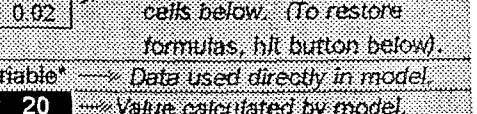
Retardation Factor*	R	1.5	(-)
or		or	
Soil Bulk Density	rho	1.8	(kg/l)
Partition Coefficient	Koc	43.7	(L/kg)
FractionOrganicCarbon	foc	2.0E-3	(-)

4. BIODEGRADATION

1st Order Decay Coeff*	lambda	0.0E+0	(per yr)
or		or	
Solute Half-Life	t-half		(year)
or Instantaneous Reaction Model			
Delta Oxygen*	DO		(mg/L)
Delta Nitrate*	NO3		(mg/L)
Observed Ferrous Iron*	Fe2+		(mg/L)
Delta Sulfate*	SO4		(mg/L)
Observed Methane*	CH4		(mg/L)

5. GENERAL

Modeled Area Length*	13000	(ft)
Modeled Area Width*	2500	(ft)
Simulation Time*	15	(yr)



6. SOURCE DATA

Source Thickness in Sat.Zone* 40 (ft)

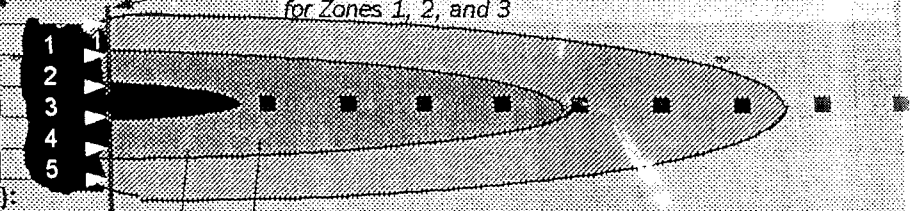
Source Zones:

	Width* (ft)	Conc. (mg/L)*
1		
2		
3	500	0.006
4	0	0
5	0	0

Source Halflife (see Help):

	<1	<1 (yr)
Inst. React.		1st Order
Soluble Mass In Source NAPL, Soil	0.15	(Kg)

Vertical Plane Source: Look at Plume Cross-Section and Input Concentrations & Widths for Zones 1, 2, and 3



View of Plume Looking Down

Observed Centerline Concentrations at Monitoring Wells
If No Data Leave Blank or Enter "0"

7. FIELD DATA FOR COMPARISON

Concentration (mg/L)										9 E-04	
Dist. from Source (ft)	0	1300	2600	3900	5200	6500	7800	9100	10400	11700	13000

8. CHOOSE TYPE OF OUTPUT TO SEE:

RUN CENTERLINE — View Output

RUN ARRAY — View Output

Help

Recalculate This Sheet

Paste Example Dataset

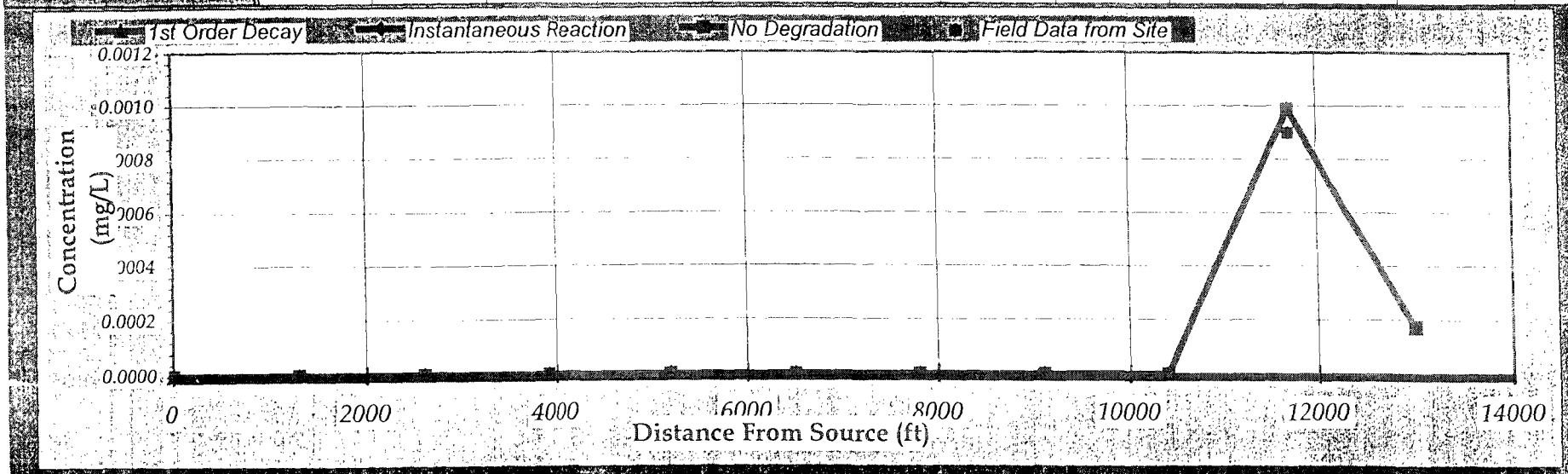
Restore Formulas for Vs, Dispersivities, R, lambda, other

Chloroform input parameters

DISSOLVED HYDROCARBON CONCENTRATION ALONG PLUME CENTERLINE (mg/L @ Z=0)

Distance from Source (ft)

TYPE OF MODEL	0	1300	2600	3900	5200	6500	7800	9100	10400	11700	13000
No Degradation	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000
1st Order Decay	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000
Inst. Reaction	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000
Field Data from Site										9.0E-04	



Time

15 Years

Calculate Animation

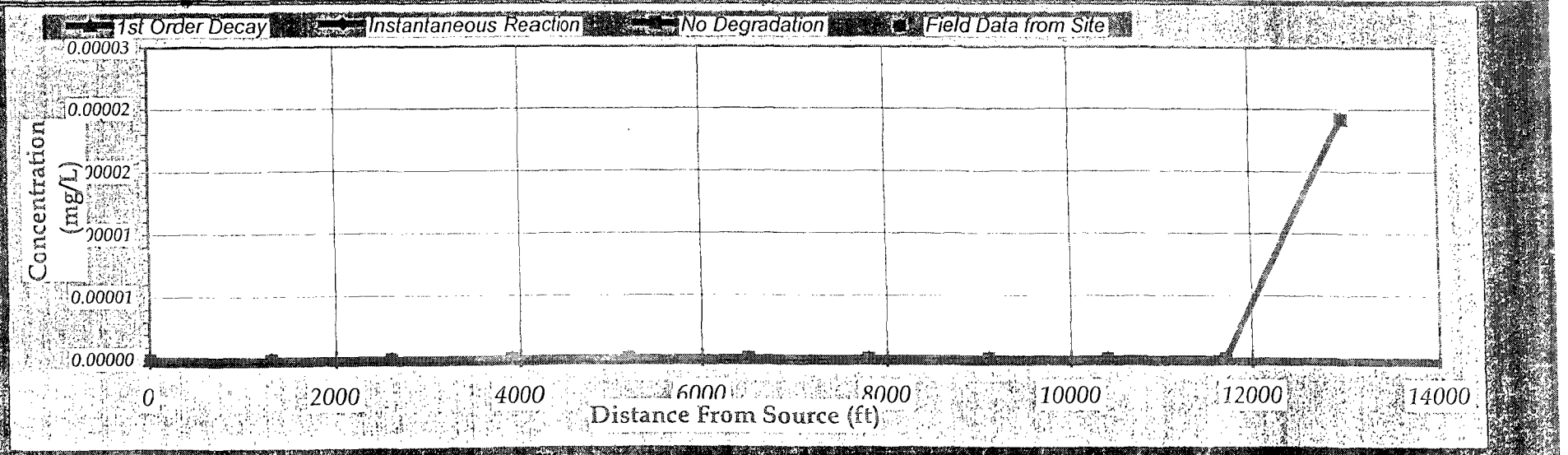
Return to Input

Recalculate This Sheet

Chloroform - Matched to RI data (simulation time = 15 years)

DISSOLVED HYDROCARBON CONCENTRATION ALONG PLUME CENTERLINE (mg/L at z=0)

TYPE OF MODEL	Distance from Source (ft)										
	0	1300	2600	3900	5200	6500	7800	9100	10400	11700	13000
No Degradation	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
1st Order Decay	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Inst. Reaction	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Field Data from Site											



Time:

18 Years

Calculate Animation

Return to Input

Recalculate This Sheet

Chloroform - Concentration below screening level (0.02 ug/L; Simulation time = 18 years; 3 years after RI)

BIOSCREEN Natural Attenuation Decision Support System

Air Force Center for Environmental Excellence — *Version 1.4*

Evergreen Manor
PCE with HRS data
Run Name

Data Input Instructions:
1. Enter value directly, ...or
2. Calculate by filling in grey cells below. (To restore formulas, hit button below).

Variable* — * Data used directly in model.
Value calculated by model. (Don't enter any data).

1. HYDROGEOLOGY

Seepage Velocity*	Vs	1138.1	(ft/yr)
or		or	
Hydraulic Conductivity	K	2.2E-01	(cm/sec)
Hydraulic Gradient	I	0.0915	(ft/ft)
Porosity	n	0.3	(-)

2. DISPERSION

Longitudinal Dispersivity*	alpha x	100.0	(ft)
Transverse Dispersivity*	alpha y	10.0	(ft)
Vertical Dispersivity*	alpha z	0.0	(ft)
or		or	
Estimated Plume Length	Lp	13000	(ft)

3. ADSORPTION

Retardation Factor*	R	2.0	(-)
or		or	
Soil Bulk Density	rho	1.8	(kg/l)
Partition Coefficient	Koc	269	(L/kg)
FractionOrganicCarbon	foc	6.0E-4	(-)

4. BIODEGRADATION

1st Order Decay Coeff*	lambda	0.0E+0	(per yr)
or		or	
Solute Half-Life	t-half		(year)
or Instantaneous Reaction Model			
Delta Oxygen*	DO		(mg/L)
Delta Nitrate*	NO3		(mg/L)
Observed Ferrous Iron*	Fe2+		(mg/L)
Delta Sulfate*	SO4		(mg/L)
Observed Methane*	CH4		(mg/L)

5. GENERAL

Modeled Area Length*	13000	(ft)
Modeled Area Width*	2500	(ft)
Simulation Time*	15	(yr)

L, W

115 or 0.02

Variable* 20

6. SOURCE DATA

Source Thickness in Sat Zone* 40 (ft)

Source Zones:

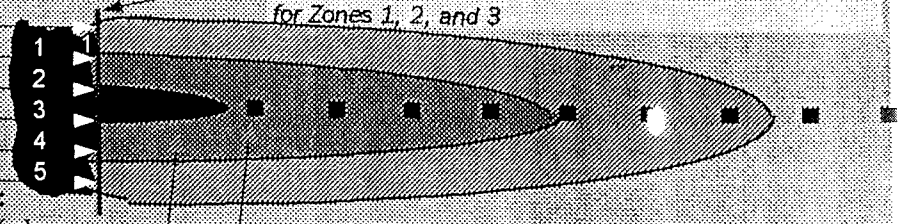
	Width* (ft)	Conc. (mg/L)*
1		
2		
3	500	0.022
4	0	0
5	0	0

Source Halflife (see Help):

Inst. React.	1st Order	
10	10	(yr)

Soluble Mass In Source NAPL, Soil: 60 (Kg)

Vertical Plane Source: Look at Plume Cross-Section and Input Concentrations & Widths for Zones 1, 2, and 3



View of Plume Looking Down

Observed Centerline Concentrations at Monitoring Wells
If No Data Leave Blank or Enter "0"

7. FIELD DATA FOR COMPARISON

Dist. from Source (ft)	Concentration (mg/L)
0	
1300	
2600	.009
3900	
5200	
6500	
7800	
9100	.004
10400	.002
11700	
13000	

8. CHOOSE TYPE OF OUTPUT TO SEE:

RUN CENTERLINE — View Output

RUN ARRAY — View Output

Help

Recalculate This Sheet

Paste Example Dataset

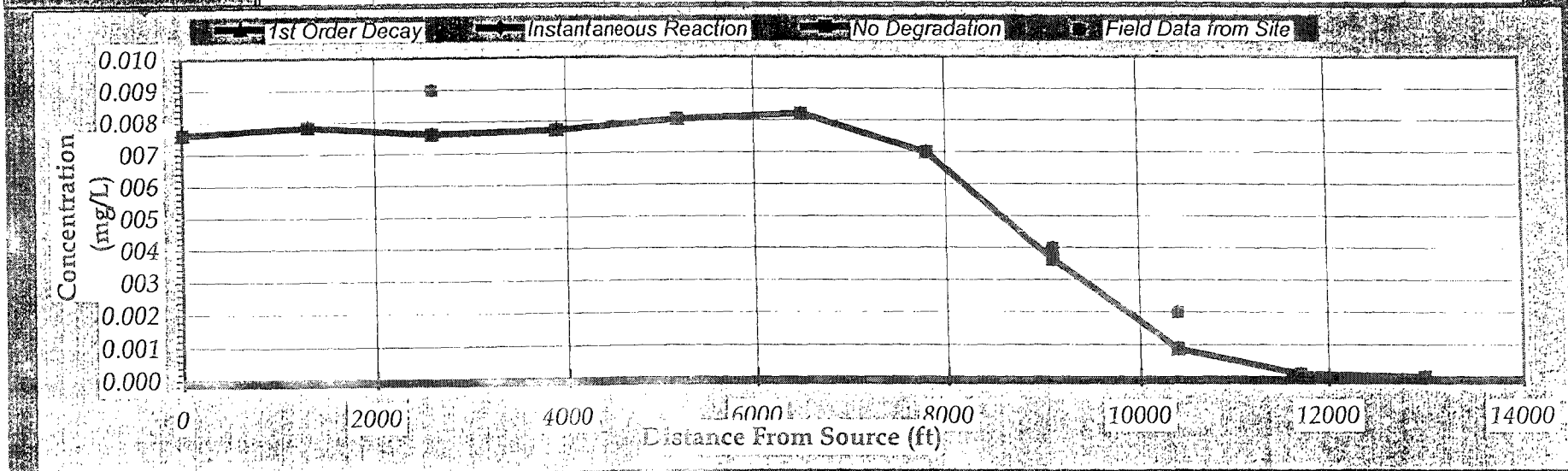
Restore Formulas for Vs, Dispersivities, R, lambda, other

PCE input parameters

DISSOLVED HYDROCARBON CONCENTRATION ALONG PLUME CENTERLINE (mg/L) (Z=0)

Distance from Source (ft)

TYPE OF MODEL	0	1300	2600	3900	5200	6500	7800	9100	10400	11700	13000
No Degradation	0.008	0.008	0.008	0.008	0.008	0.008	0.007	0.004	0.001	0.000	0.000
1st Order Decay	0.008	0.008	0.008	0.008	0.008	0.008	0.007	0.004	0.001	0.000	0.000
Inst. Reaction	0.008	0.008	0.008	0.008	0.008	0.008	0.007	0.004	0.001	0.000	0.000
Field Data from Site			0.009					0.004	0.002		



Calculate Animation

Time

15 Years

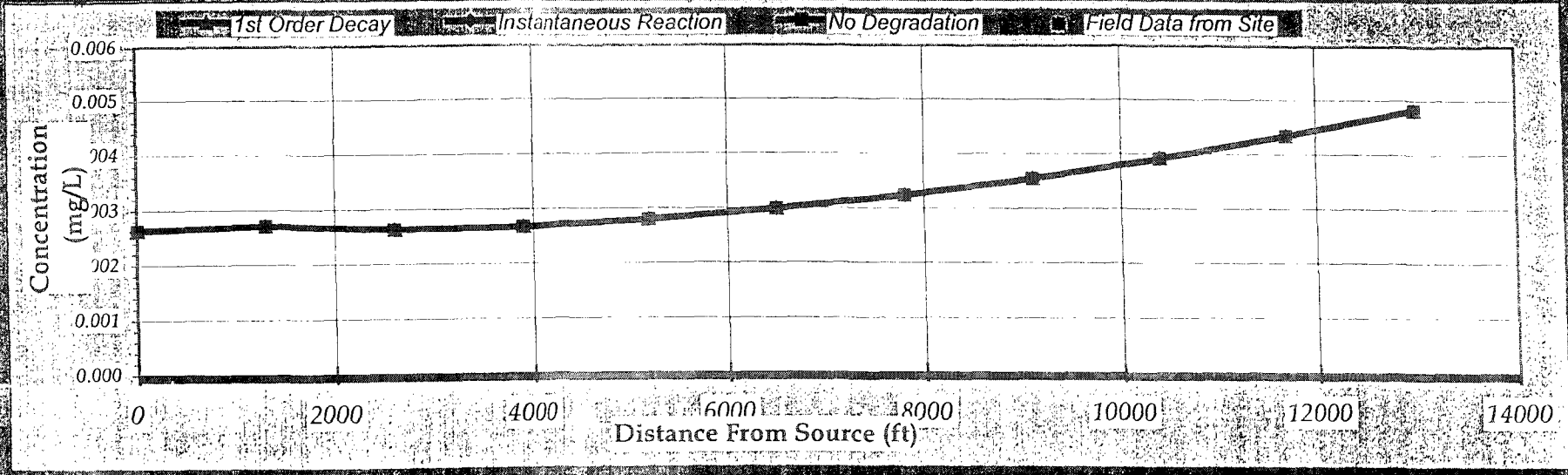
Return to Input

Recalculate This Sheet

PCE - Matched to RI data (simulation time = 15 years)

DISSOLVED HYDROCARBON CONCENTRATION ALONG PLUME CENTERLINE (mg/L) (Z=0)

TYPE OF MODEL	Distance from Source (ft)										
	0	1300	2600	3900	5200	6500	7800	9100	10400	11700	13000
No Degradation	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.004	0.004	0.004	0.005
1st Order Decay	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.004	0.004	0.004	0.005
Inst. Reaction	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.004	0.004	0.004	0.005
Field Data from Site											



Calculate Animation

Time: 30 Years

Return to Input

Recalculate This Sheet

PCE - Concentrations below screening level (5 ug/l; Simulation time = 30 years; 15 years after RI)

subdivisions that are situated above the maximum extent of both the TCE and PCE plume have been connected to the NPPWD water supply. However, there are several commercial and residential homes located in the vicinity of the TCE and PCE plume near the apparent source area that do not appear to be connected to the municipal water supply. These areas were identified in Figure 3-4 and include the following streets: Metric, East Rockton Road, North Second Street, and Degroff.

5.5.1 TCE AND PCE CONCENTRATION TREND ANALYSIS

In an effort to evaluate trends in the TCE and/or PCE concentrations reported in the groundwater throughout the Evergreen Manor site over time, locations where multiple samples have historically been collected were identified and groundwater sample results assembled. As many as 26 residential wells have been sampled more than once, and in several instances, have been sampled more than three times since 1990. In addition, several of the permanent groundwater monitoring wells installed during the 1994 and 1995 time frame have been sampled on multiple occasions. These locations and the corresponding TCE and PCE data are shown on Figures 5-14 and Figure 5-15, respectively. To provide a more thorough evaluation of the historical data, the groundwater data obtained from the CPT samples collected as part of the 2000 RI have been included on these figures.

As shown in the data plots provided in Figure 5-14, with few exceptions, the TCE concentrations are either stable, or have declined throughout the historical plume boundaries. TCE concentrations tend to be decreasing in the upgradient portion of the plume, north of Straw Lane, and tend to be stable in the downgradient part of the plume. In nearly all cases, the TCE reported in the groundwater samples have declined to concentrations below the MCL (5 µg/L). These observations coupled with the site hydrogeological conditions suggest that the plume as a whole is shrinking, perhaps due to advective transport.

As previously described, the volume of PCE data reported is not consistent with that reported for TCE. However, even with the amount of PCE data, it is evident that PCE concentrations are stable

at a minimum, and in most cases, are declining throughout the Evergreen Manor site. This is evident in Figure 5-15, where with the exception of monitoring wells MW-104, MW-105, and MW-106, and in the vicinity of Blue Spruce Drive and Straw Lane, concentrations have shown a steady decline. The area where PCE concentrations are not decreasing is limited to the central portion of the plume, where limited groundwater monitoring locations are present. As a result, an accurate depiction of the nature of the PCE plume is not available.

In general, the VOC concentrations reported from the 1990 through 2002 investigations have either declined or have remained stable. The TCE and PCE concentration trends depicted suggest that both TCE and PCE are undergoing natural decay that follows first-order kinetics. In other words, the decay rate is directly proportional to the contaminant concentration and slows with a decline in the contaminant concentration. For example, the TCE concentration associated with monitoring well MW-105D reduces from 15 µg/L at time t=0 (HRS sampling event in 1994) to 3 µg/L at time t=5 years (2000 RI sampling event), representing approximately 80% decline over 5 years. The concentration further declines from 3 µg/L at time t=5 years to 2.8 µg/L at time t=7 years (April 2002 sampling period), a reduction of only 7% in 2 years.

Assuming that the observed contaminant attenuation rate continues in the future, it was projected that the TCE concentration of 7.2 µg/L, observed in monitoring well MW-03 in 2002, could decline to less than 5 µg/L in approximately 1.5 years. This time period was derived by assuming, conservatively, that TCE decay rate will follow the TCE attenuation trend observed in monitoring well MW-105D described above. Similarly, it was projected that by following the PCE attenuation rate observed in monitoring well MW-103S, the 2002 PCE concentration of 5.9 µg/L, observed in monitoring well MW-03, could decline to less than 5 µg/L in approximately 3 years.

Results of the foregoing first order kinetics are consistent with the results of the RI which concluded that constituent concentrations, will continue to decline, primarily due to dispersion, advection, and possibly due to biodegradation, and ultimately decline below MCLs. During the 2000 RI, the

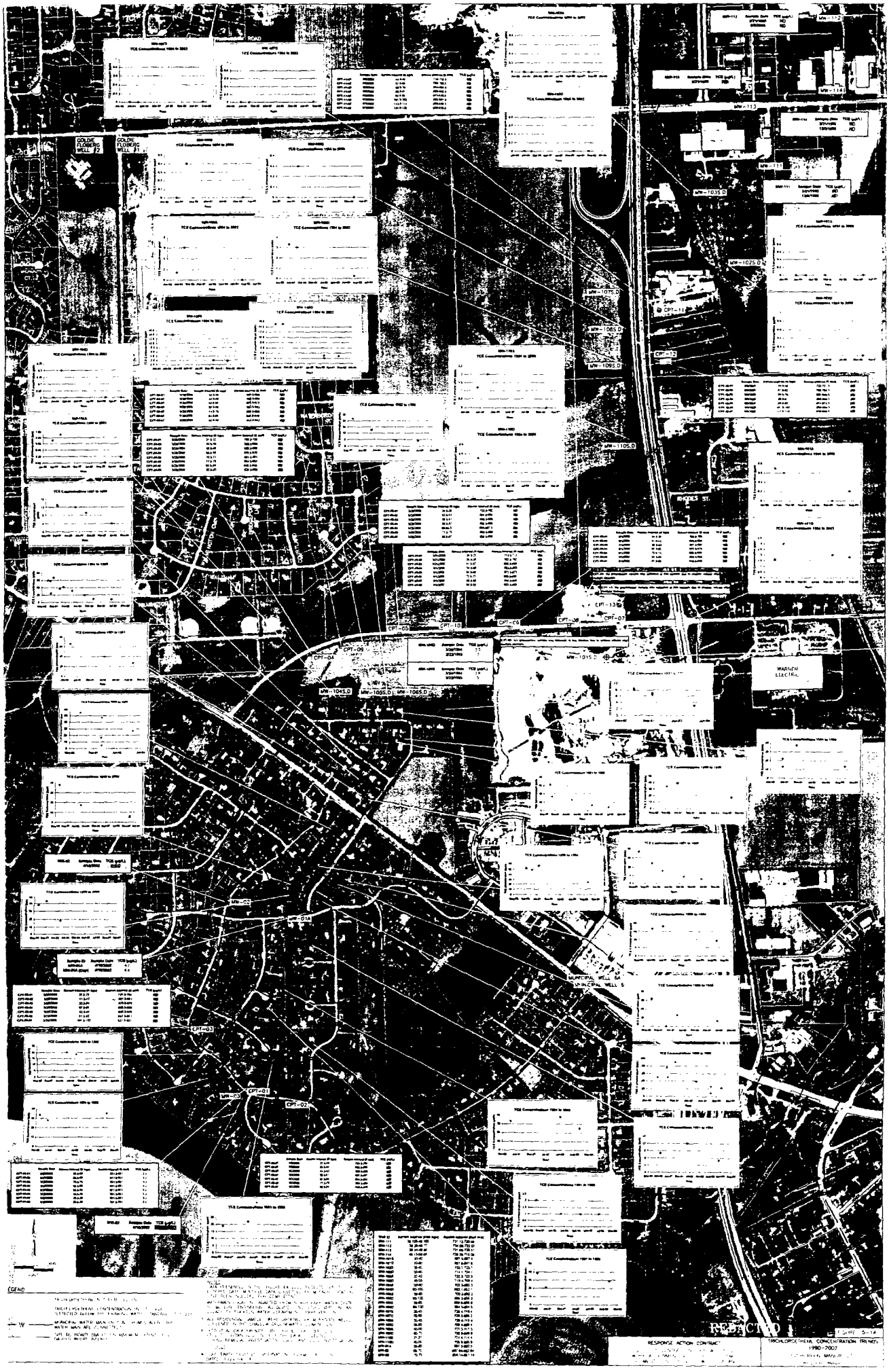
BIOSCREEN model was used to estimate the time frame during which COPC concentrations would decline below MCLs. The model results predicted that TCE concentrations would reduce below the MCLs in about 6 years after the RI, (approximately 2006). The same model predicted that PCE would reduce below the MCLs in about 15 years after the RI, (in about 2015).

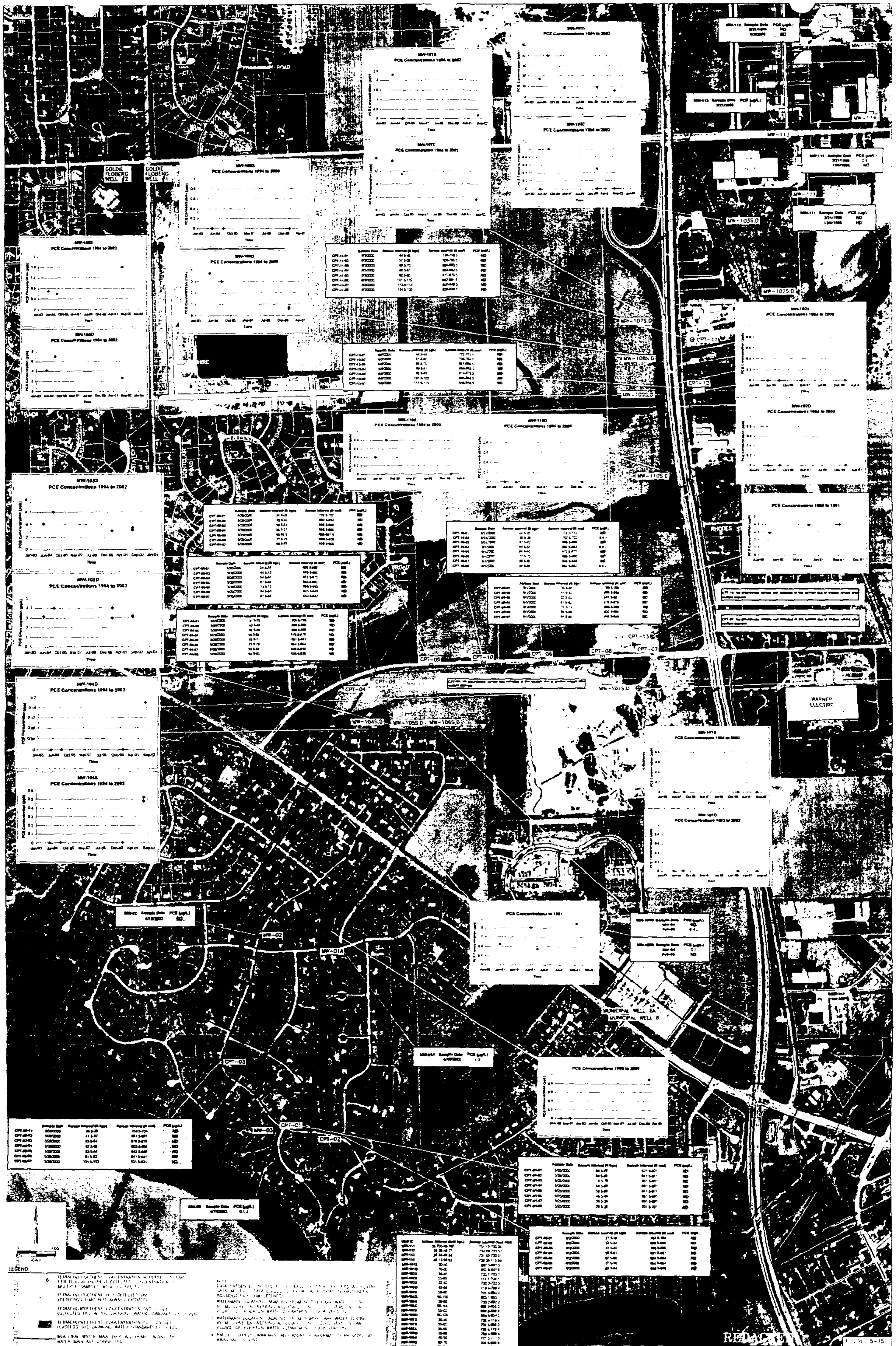
Although the expected TCE attenuation rate predicted by the BIOSCREEN model is similar to the attenuation rate predicted by the kinetic model, the PCE attenuation rates predicted by the two models vary significantly. Apparently, the continuing decline in PCE concentrations, observed during the 2002 Investigation, point to an accelerated decline in PCE concentrations.

5.6 SEDIMENT AND SURFACE WATER SAMPLING RESULTS 2000 TO 2002

As part of both the 2000 RI and the April 2002 Investigation, sediment and surface water samples were collected from the Rock River. During the 2000 RI, sediment and surface water samples were also collected from Dry Creek. As previously mentioned, Dry Creek was classified as a losing stream at the time of the RI, indicating that it would contribute water to the subsurface as well as discharge into the Rock River. This in turn indicates that the Dry Creek may be a source of groundwater contamination for some contaminants.

The location of the sediment and surface water samples collected during both investigations is depicted in Figure 4-8. As shown in Figure 4-8, sediment sample SED-4 and surface water sample SW-4, collected during the 2000 RI, are located to the north of the Evergreen Manor site and were therefore, considered as background samples with respect to the presumed groundwater discharge zone near the Rock River. Similarly, sediment sample SED-1 and surface water sample SW-1, also collected during the 2000 RI, are located upgradient of the confluence of the Rock River and Dry Creek and were also considered as background samples with respect to the presumed groundwater discharge zone near the Rock River. All other surface water and sediment samples collected from locations along the Dry Creek were not considered "background" samples because these locations


GOLDIE FLOBERG WELL #2
GOLDIE FLOBERG WELL #1
MW-1035.D
MW-1025.D
MW-1075.D
MW-1065.D
MW-1095.D
MW-1105.D
CPT-13
CPT-07
CPT-16
CPT-10
CPT-05
CPT-09
CPT-04
MW-1045.D
MW-1055.D
MW-1065.D
MW-1015.D
WARNER ELECTRIC
MW-02
MW-01A
MUNICIPAL WELL #3
CPT-03
MW-03
CPT-01
CPT-02
REDACTED
RESPONSE ACTION CONTRACT
TRICHLOROETHENE CONCENTRATION TRENDS
1990 - 2007



LEGEND

RESPONSE ACTION CONTRACT

TETRACHLOROETHENE CONCENTRATION TRENDS

FIGURE 5-15

APPENDIX C

North Park Public Water District
Chloroform Results

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

E NUMBER : 0111100
.ING POINT DESC. : 0901/NORTH PARK PWD/[redacted] METRIC DR

TT ; SOURCE # : 201550001 SITE # : 010926
COLLECTED : 011003 TIME COLLECTED : 0950 SAMPLING PROGRAM : TH

CTED BY : GMK DELIVERED BY : UPS
NTS : HAAS & THMS
NG CODE : PW32 AGENCY ROUTING : UNIT CODE :
YPE CODE : [redacted] SAMPLE PURPOSE CODE : 1 REPORTING INDICATOR : B
taken from distribution system
RECEIVED : 011004 TIME RECEIVED : 0900 RECEIVED BY : J M
BSERVATIONS : 3-60ML/2-40ML THM TRIP BL SAM# : 0111101
VISORS INITIALS : GLG NOTE : K = LESS THAN VALUE

6	CHLOROFORM	UG/L :	4
1	BROMODICHLOROMETHANE	UG/L :	3
5	CHLORODIBROMOMETHANE	UG/L :	2
4	BROMOFORM	UG/L :	1.0K
	TOTAL THMS	UG/L :	9

CEPTABLE QUALITY CONTROL COULD NOT BE

HIEVED FOR METHOD 552.2 ANALYSIS. A
SAMPLE FOR THIS ANALYSIS WAS REQUESTED ON
/22/01.

cmc

THMs

Illinois Environmental Protection Agency
1021 NORTH GRAND AVENUE EAST, P.O. BOX 19276
SPRINGFIELD, ILLINOIS 62794-9276

Andrea Rhodes
Environmental Protection Specialist
Bureau of Water

217 524 8113 - direct line
217/785-0561
217/557-1407 FAX
E-Mail: epa1215@epa.state.il.us

(9)

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

LE NUMBER : 0011332
LING POINT DESC. : 0900/NORTH PARK PWD/[redacted] ELEVATOR ROAD

ITTING SOURCE # : 201550001 SITE # : 000919
COLLECTED : 000925 TIME COLLECTED : 1505 SAMPLING PROGRAM : TH

ECTED BY : GMK DELIVERED BY : UPS
ENTS : HAAS & THMS
ING CODE : PW32 AGENCY ROUTING : UNIT CODE :
TYPE CODE : DPWS SAMPLE PURPOSE CODE : 1 REPORTING INDICATOR : B

RECEIVED : 000926 TIME RECEIVED : 0900 RECEIVED BY : J M
OBSERVATIONS : 3-60ML/2-40ML THM TRIP BL SAM# : 0011333
RVISORS INITIALS : GLG NOTE : K = LESS THAN VALUE

06	CHLOROFORM	UG/L	1
01	BROMODICHLOROMETHANE	UG/L	2
05	CHLORODIBROMOMETHANE	UG/L	2
04	BROMOFORM	UG/L	1.0K
	TOTAL THMS	UG/L	5
13	MONOCHLOROACETIC ACID (MCAA)	UG/L	2.0K
16	MONOBROMOACETIC ACID (MBAA)	UG/L	1.0K
88	DICHLOROACETIC ACID (DCAA)	UG/L	1.0K
23	TRICHLOROACETIC ACID (TCAA)	UG/L	1.0K
21	DIBROMOACETIC ACID (DBAA)	UG/L	1.0K

cmc

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

LE NUMBER : D011331
LING POINT DESC. : 0900/NORTH PARK PWD/WELLS 6 & 6A

IT IG SOURCE # : 201550005 SITE # : 000919
COLLECTED : 000925 TIME COLLECTED : 1450 SAMPLING PROGRAM : TH

ECTED BY : GMC DELIVERED BY : UPS
ENTS : HAAS & THMS
ING CODE : PW32 AGENCY ROUTING : UNIT CODE :
TYPE CODE : DPWS SAMPLE PURPOSE CODE : 1 REPORTING INDICATOR : B

RECEIVED : 000926 TIME RECEIVED : 0900 RECEIVED BY : J M
OBSERVATIONS : 3-60ML/2-40ML THM TRIP BL SAM# : D011333
RVISORS INITIALS : GLG NOTE : K = LESS THAN VALUE

06	CHLOROFORM	UG/L :	1
01	BROMODICHLOROMETHANE	UG/L :	2
05	CHLORODIBROMOMETHANE	UG/L :	3
04	BROMOFORM	UG/L :	1
	TOTAL THMS	UG/L :	7
13	MONOCHLOROACETIC ACID (MCAA)	UG/L :	2.0K
16	MONOBROMOACETIC ACID (MBAA)	UG/L :	1.0K
88	DICHLOROACETIC ACID (DCAA)	UG/L :	1.0K
23	TRICHLOROACETIC ACID (TCAA)	UG/L :	1.0K
21	DIBROMOACETIC ACID (DBAA)	UG/L :	1.0K

GMC

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

.E NUMBER : D006456
.ING POINT DESC. : 0600/NORTH PARK PWD/WELL 5/[redacted] METRIC

ITTING SOURCE # : 201550001 SITE # : 000601
COLLECTED : 000619 TIME COLLECTED : 1200 SAMPLING PROGRAM : TH

ECTED BY : GMK DELIVERED BY : UPS
ENTS : HAAS & THMS
ING CODE : PW32 AGENCY ROUTING : UNIT CODE :
TYPE CODE : DPWS SAMPLE PURPOSE CODE : 1 REPORTING INDICATOR : B

RECEIVED : 000620 TIME RECEIVED : 0900 RECEIVED BY : MAH
OBSERVATIONS : 3-60ML/2-40ML THM TRIP BL SAM# : D006457
RVISORS INITIALS : GLG NOTE : K = LESS THAN VALUE

06	CHLOROFORM	UG/L :	3
01	BROMODICHLOROMETHANE	UG/L :	3
05	CHLORODIBROMOMETHANE	UG/L :	4
04	BROMOFORM	UG/L :	1
	TOTAL THMS	UG/L :	11
13	MONOCHLOROACETIC ACID (MCAA)	UG/L :	2.0K
16	MONOBROMOACETIC ACID (MBAA)	UG/L :	1.0K
88	DICHLOROACETIC ACID (DCAA)	UG/L :	1.0K
23	TRICHLOROACETIC ACID (TCAA)	UG/L :	1.0K
21	DIBROMOACETIC ACID (DBAA)	UG/L :	1.0K

CMC

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

LE NUMBER : D003249
'LI[illegible] POINT DESC. : 0300/NORTH PARK PWD/WELL 5/ROCKTON RD

IITTING SOURCE # : 201550001 SITE # : 000308
: COLLECTED : 000327 TIME COLLECTED : 1135 SAMPLING PROGRAM : TH

.ECTED BY : GMK DELIVERED BY : UPS
IENTS : HAAS & THMS
)ING CODE : PW32 AGENCY ROUTING : UNIT CODE :
TYPE CODE : DPWS SAMPLE PURPOSE CODE : 1 REPORTING INDICATOR : B

: RECEIVED : 000329 TIME RECEIVED : 0900 RECEIVED BY : S L
OBSERVATIONS : 3-60ML/2-40ML THM TRIP BL SAM# : D003250
:RVISORS INITIALS : GLG NOTE : K = LESS THAN VALUE

-G6	CHLOROFORM	UG/L :	1
101	BROMODICHLOROMETHANE	UG/L :	2
105	CHLORODIBROMOMETHANE	UG/L :	2
104	BROMOFORM	UG/L :	1
	TOTAL THMS	UG/L :	6
213	MONOCHLOROACETIC ACID (MCAA)	UG/L :	2.0K
116	MONOBROMOACETIC ACID (MBAA)	UG/L :	1.0K
288	DICHLOROACETIC ACID (DCAA)	UG/L :	1.0K
723	TRICHLOROACETIC ACID (TCAA)	UG/L :	1.0K
721	DIBROMOACETIC ACID (DBAA)	UG/L :	1.0K

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

LE NUMBER : D914327
LING POINT DESC. : 1299/NORTH PARK PWD/WELL 5

ITTING SOURCE # : 201550001 SITE # : 991130
COLLECTED : 991206 TIME COLLECTED : 1015 SAMPLING PROGRAM : TH

ECTED BY : G. KIRBY DELIVERED BY : UPS
ENTS : HAAS & THMS
ING CODE : PW32 AGENCY ROUTING : UNIT CODE :
TYPE CODE : DPWS SAMPLE PURPOSE CODE : 1 REPORTING INDICATOR : B

RECEIVED : 991207 TIME RECEIVED : 0900 RECEIVED BY : S L
OBSERVATIONS : 3-60ML/2-40ML THM TRIP BL SAM# : D914328
RVISORS INITIALS : GLG NOTE : K = LESS THAN VALUE

06	CHLOROFORM	UG/L :	2
01	BROMODICHLOROMETHANE	UG/L :	3
05	CHLORODIBROMOMETHANE	UG/L :	3
04	BROMOFORM	UG/L :	1
	TOTAL THMS	UG/L :	9
13	MONOCHLOROACETIC ACID (MCAA)	UG/L :	2.0K
16	MONOBROMOACETIC ACID (MBAA)	UG/L :	1.0K
88	DICHLOROACETIC ACID (DCAA)	UG/L :	1.0K
23	TRICHLOROACETIC ACID (TCAA)	UG/L :	1.0K
21	DIBROMOACETIC ACID (DBAA)	UG/L :	1.0K

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

LE NUMBER : D910827
LING POINT DESC. : 0999/NORTH PARK PWD/[redacted] GLEASMAN ROAD

ITTING SOURCE # : 201550001 SITE # : 990909
COLLECTED : 990920 TIME COLLECTED : 1010 SAMPLING PROGRAM : TH

ECTED BY : GMK DELIVERED BY : UPS
ENTS : HAAS & THMS
ING CODE : PW32 AGENCY ROUTING : UNIT CODE :
TYPE CODE : DPWS SAMPLE PURPOSE CODE : 1 REPORTING INDICATOR : B

RECEIVED : 990921 TIME RECEIVED : 0900 RECEIVED BY : S L
OBSERVATIONS : 3-60ML/2-40ML THM TRIP BL SAM# : D910828
RVISORS INITIALS : GLG NOTE : K = LESS THAN VALUE

06	CHLOROFORM	UG/L :	1
01	BROMODICHLOROMETHANE	UG/L :	1
05	CHLORODIBROMOMETHANE	UG/L :	2
04	BROMOFORM	UG/L :	1.0K
	TOTAL THMS	UG/L :	4
13	MONOCHLOROACETIC ACID (MCAA)	UG/L :	2.0K
16	MONOBROMOACETIC ACID (MBAA)	UG/L :	1.0K
88	DICHLOROACETIC ACID (DCAA)	UG/L :	1.0K
23	TRICHLOROACETIC ACID (TCAA)	UG/L :	1.0K
21	DIBROMOACETIC ACID (DBAA)	UG/L :	1.0K

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

LE NUMBER : D906375
LING POINT DESC. : 0699/NORTH PARK PWD/WELL 5

ITTING SOURCE # : 201550001 SITE # : 990610
COLLECTED : 990614 TIME COLLECTED : 1045 SAMPLING PROGRAM : TH

ECTED BY : GWK DELIVERED BY : UPS
ENTS : HAAS & THMS
ING CODE : PW32 AGENCY ROUTING : UNIT CODE :
TYPE CODE : DPWS SAMPLE PURPOSE CODE : 1 REPORTING INDICATOR : B

RECEIVED : 990615 TIME RECEIVED : 0900 RECEIVED BY : MAH
DBSERVATIONS : 3-60ML/2-40ML THM TRIP BL SAM# : D906376
RVISORS INITIALS : GLG NOTE : K = LESS THAN VALUE

06	CHLOROFORM	UG/L : 3	
01	BROMODICHLOROMETHANE	UG/L : 4	
05	CHLORODIBROMOMETHANE	UG/L : 4	
04	BROMOFORM	UG/L : 1	
	TOTAL THMS	UG/L : 12	
13	MONOCHLOROACETIC ACID (MCAA)	UG/L : 2.0K	
16	MONOBROMOACETIC ACID (MBAA)	UG/L : 1.0K	
38	DICHLOROACETIC ACID (DCAA)	UG/L : 1.0K	
23	TRICHLOROACETIC ACID (TCAA)	UG/L : 1.0K	
21	DIBROMOACETIC ACID (DBAA)	UG/L : 1.0K	

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

LE NUMBER : D903178
LI! POINT DESC. : 0399/NORTH PARK PWD/[redacted] GLEASMAN ROAD

ITTING SOURCE # : 201550001 SITE # : 990318
COLLECTED : 990323 TIME COLLECTED : 1300 SAMPLING PROGRAM : TH

ECTED BY : GMK DELIVERED BY : UPS
ENTS : THMS/REPLACEMENT SAMPLE FOR #D902921
ING CODE : PW32 AGENCY ROUTING : UNIT CODE :
TYPE CODE : DPWS SAMPLE PURPOSE CODE : 3 REPORTING INDICATOR : B

RECEIVED : 990324 TIME RECEIVED : 0900 RECEIVED BY : MAH
OBSERVATIONS : 2-40ML THMS TRIP BL SAM# : D903180
RVISORS INITIALS : GLG NOTE : K = LESS THAN VALUE

06	CHLOROFORM	UG/L :	1.0K
01	BROMODICHLOROMETHANE	UG/L :	1
05	CHLORODIBROMOMETHANE	UG/L :	1
04	BROMOFORM	UG/L :	1.0K
	TOTAL THMS	UG/L :	2

cw

1/1

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

_E NUMBER : D903179
_ING POINT DESC. : 0399/NORTH PARK PWD/[redacted]ROCKTON ROAD

ITTING SOURCE # : 201550005 SITE # : 990318
COLLECTED : 990323 TIME COLLECTED : 1230 SAMPLING PROGRAM : TH

ECTED BY : GMK DELIVERED BY : UPS
ENTS : THMS/REPLACEMENT SAMPLE FOR #D902920
ING CODE : PW32 AGENCY ROUTING : UNIT CODE :
TYPE CODE : DPWS SAMPLE PURPOSE CODE : 3 REPORTING INDICATOR : B

RECEIVED : 990324 TIME RECEIVED : 0900 RECEIVED BY : MAH
OBSERVATIONS : 2-40ML THMS TRIP BL SAM# : D903180
RVISORS INITIALS : GLG NOTE : K = LESS THAN VALUE

06	CHLOROFORM	UG/L	1
01	BROMODICHLOROMETHANE	UG/L	2
05	CHLORODIBROMOMETHANE	UG/L	3
04	BROMOFORM	UG/L	1
	TOTAL THMS	UG/L	7

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

LE NUMBER : D814874
LIN[illegible] POINT DESC. : 1298/NORTH PARK PWD/[redacted] TURRET DR

ITTING SOURCE # : 201550001 SITE # : 981202
COLLECTED : 981207 TIME COLLECTED : 0900 SAMPLING PROGRAM : TH

ECTED BY : GK DELIVERED BY : UPS
ENTS : HAAS & THMS
ING CODE : PW32 AGENCY ROUTING : UNIT CODE :
TYPE CODE : DPWS SAMPLE PURPOSE CODE : 1 REPORTING INDICATOR : B

RECEIVED : 981208 TIME RECEIVED : 0900 RECEIVED BY : G S
OBSERVATIONS : 3-60ML/2-40ML THM TRIP BL SAM# : D814876
RVISORS INITIALS : GLG NOTE : K = LESS THAN VALUE

06	CHLOROFORM	UG/L	1.0K
01	BROMODICHLOROMETHANE	UG/L	1
05	CHLORODIBROMOMETHANE	UG/L	1
04	BROMOFORM	UG/L	1.0K
	TOTAL THMS	UG/L	2
13	MONOCHLOROACETIC ACID (MCAA)	UG/L	2.0K
16	MONOBROMOACETIC ACID (MBAA)	UG/L	1.0K
88	DICHLOROACETIC ACID (DCAA)	UG/L	1.0K
23	TRICHLOROACETIC ACID (TCAA)	UG/L	1.0K
21	DIBROMOACETIC ACID (DBAA)	UG/L	1.0K

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

LE NUMBER : D814875
LING POINT DESC. : 1298/NORTH PARK PWD/[redacted] N 2ND ST

ITTING SOURCE # : 201550005 SITE # : 981202
COLLECTED : 981207 TIME COLLECTED : 1030 SAMPLING PROGRAM : TH

ECTED BY : GK DELIVERED BY : UPS
ENTS : HAAS & THMS
ING CODE : PW32 AGENCY ROUTING : UNIT CODE :
TYPE CODE : DPWS SAMPLE PURPOSE CODE : 1 REPORTING INDICATOR : B

RECEIVED : 981208 TIME RECEIVED : 0900 RECEIVED BY : G S
OBSERVATIONS : 3-60ML/2-40ML THM TRIP BL SAM# : D814876
RVISORS INITIALS : GLG NOTE : K = LESS THAN VALUE

06	CHLOROFORM	UG/L :	1
01	BROMODICHLOROMETHANE	UG/L :	1
05	CHLORODIBROMOMETHANE	UG/L :	1
04	BROMOFORM	UG/L :	1.0K
	TOTAL THMS	UG/L :	3
13	MONOCHLOROACETIC ACID (MCAA)	UG/L :	2.0K
16	MONOBROMOACETIC ACID (MBAA)	UG/L :	1.0K
88	DICHLOROACETIC ACID (DCAA)	UG/L :	1.0K
23	TRICHLOROACETIC ACID (TCAA)	UG/L :	1.0K
21	DIBROMOACETIC ACID (DBAA)	UG/L :	1.0K

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

PLE NUMBER : D811433
PLING POINT DESC. : 0998/NORTH PARK PWD/WELL 5

MITTING SOURCE # : 201550001 SITE # : 980903
E COLLECTED : 980909 TIME COLLECTED : 1120 SAMPLING PROGRAM : TH

LECTED BY : M. KRAUSE DELIVERED BY : UPS
MENTS : HAAS & THMS
DING CODE : PW32 AGENCY ROUTING : UNIT CODE :
TYPE CODE : DPWS SAMPLE PURPOSE CODE : 1 REPORTING INDICATOR : B

E RECEIVED : 980910 TIME RECEIVED : 0900 RECEIVED BY : S L
OBSERVATIONS : 3-60ML/2-40ML THM TRIP BL SAM# : D811434
ERVISORS INITIALS : GLG NOTE : K = LESS THAN VALUE

106	CHLOROFORM	UG/L :	1.0K
101	BROMODICHLOROMETHANE	UG/L :	1
105	CHLORODIBROMOMETHANE	UG/L :	1
104	BROMOFORM	UG/L :	1.0K
	TOTAL THMS	UG/L :	2
21	MONOCHLOROACETIC ACID (MCAA)	UG/L :	2.0K
016	MONOBROMOACETIC ACID (MBAA)	UG/L :	1.0K
288	DICHLOROACETIC ACID (DCAA)	UG/L :	1.0K
723	TRICHLOROACETIC ACID (TCAA)	UG/L :	1.0K
721	DIBROMOACETIC ACID (DBAA)	UG/L :	1.0

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

IPLE NUMBER : D811432
IPLING POINT DESC. : 0998/NORTH PARK PWD/WELLS 6 & 6A

MITTING SOURCE # : 201550005 SITE # : 980903
E COLLECTED : 980909 TIME COLLECTED : 1155 SAMPLING PROGRAM : TH

LECTED BY : M. KRAUSE DELIVERED BY : UPS
MENTS : HAAS & THMS
DING CODE : PW32 AGENCY ROUTING : UNIT CODE :
TYPE CODE : DPWS SAMPLE PURPOSE CODE : 1 REPORTING INDICATOR : B

E RECEIVED : 980910 TIME RECEIVED : 0900 RECEIVED BY : S L
OBSERVATIONS : 3-60ML/2-40ML THM TRIP BL SAM# : D811434
ERVISORS INITIALS : GLG NOTE : K = LESS THAN VALUE

106	CHLOROFORM	UG/L	: 4
101	BROMODICHLOROMETHANE	UG/L	: 4
105	CHLORODIBROMOMETHANE	UG/L	: 3
104	BROMOFORM	UG/L	: 1
	TOTAL THMS	UG/L	: 12
213	MONOCHLOROACETIC ACID (MCAA)	UG/L	: 2.0K
016	MONOBROMOACETIC ACID (MBAA)	UG/L	: 1.0K
288	DICHLOROACETIC ACID (DCAA)	UG/L	: 1.2
723	TRICHLOROACETIC ACID (TCAA)	UG/L	: 1.0K
721	DIBROMOACETIC ACID (DBAA)	UG/L	: 1.0K

DKM

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

PLE NUMBER : D714505
PLING POINT DESC. : 1197/NORTH PARK PWD/DIST 05 CEDARBROOK

MI NG SOURCE # : 201550005 SITE # :
E COLLECTED : 971117 TIME COLLECTED : 1130 SAMPLING PROGRAM : MT

LECTED BY : DENNIS DELIVERED BY : UPS
MENTS : THMS/MAXIMUM TRIHALOMETHANE POTENTIAL
DING CODE : PW32 AGENCY ROUTING : -- UNIT CODE :
TYPE CODE : DPWS SAMPLE PURPOSE CODE : 1 REPORTING INDICATOR : B

E RECEIVED : 971118 TIME RECEIVED : 0910 RECEIVED BY : G S
OBSERVATIONS : 3-40ML MTP TRIP BL SAM# : D714507
ERVISORS INITIALS : RTN NOTE : K = LESS THAN VALUE

106 CHLOROFORM	UG/L :	9
101 BROMODICHLOROMETHANE	UG/L :	2
105 CHLORODIBROMOMETHANE	UG/L :	1
104 BROMOFORM	UG/L :	1.0K

012

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

PLE NUMBER : D614872
PLING POINT DESC. : 1196/NORTH PARK PWD/WELL #5 [redacted] TULLET

MITTING SOURCE # : 201550001 SITE # : 961028
E COLLECTED : 961118 TIME COLLECTED : 1330 SAMPLING PROGRAM : MT

LECTED BY : M.KRAUSE DELIVERED BY : UPS
MENTS : THMS/MAXIMUM TRIHALOMETHANE POTENTIAL
DING CODE : PW32 AGENCY ROUTING : -- UNIT CODE :
TYPE CODE : DPWS SAMPLE PURPOSE CODE : 1 REPORTING INDICATOR : 8

E RECEIVED : 961119 TIME RECEIVED : 0900 RECEIVED BY : GLS
OBSERVATIONS : 3-40-ML POTENTIAL TRIP BL SAM# : 0614873
ERVISORS INITIALS : RTN NOTE : K = LESS THAN VALUE

106	CHLOROFORM	UG/L	: 12
101	BROMODICHLOROMETHANE	UG/L	: 8
105	CHLORODIBROMOMETHANE	UG/L	: 6
104	BROMOFORM	UG/L	: 1

O2>

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

PLE NUMBER : D600914
PLING POINT DESC. : 1195/NORTH PARK PWD/WELL # 5

MIT.ING SOURCE # : 201550001 SITE # : 960104
E COLLECTED : 960122 TIME COLLECTED : 1040 SAMPLING PROGRAM : MT

LECTED BY : L.ELLIS DELIVERED BY : UPS
MENTS : THMS/MAXIMUM TRIHALOMETHANE POTENTIAL REPLACEMENT
DING CODE : PW32 AGENCY ROUTING : -- UNIT CODE :
TYPE CODE : DPWS SAMPLE PURPOSE CODE : 3 REPORTING INDICATOR : B

E RECEIVED : 960123 TIME RECEIVED : 0900 RECEIVED BY : GLS
OBSERVATIONS : 3-40-ML POTENTIAL TRIP BL SAM# : D600915
ERVISORS INITIALS : RTN NOTE : K = LESS THAN VALUE

106 CHLOROFORM	UG/L	: 12
101 BROMODICHLOROMETHANE	UG/L	: 11
105 CHLORODIBROMOMETHANE	UG/L	: 7
104 BROMOFORM	UG/L	: 2

32

APPENDIX D

VOCs in North Park Well #6 Casing Coating

Table 4-8
Pipe Coating Scrape Sample Results -- Well No. 6
Evergreen Manor Site
Roscoe, Illinois

Sample ID	EM3-E0001CS	2003ZG06E001	2003ZG06E002	2003ZG06E003	2003ZG06E004
Field Sample ID	PS-01	NPW6-PS-02	NPW6-PS-03	NPW6-PS-04	NPW6-PS-05
Sample Date	10/28/2002	12/12/2002	12/12/2002	12/12/2002	12/12/2002
Sample Location (on pipe)	Outside, composite	Upper, outside	Inside, composite	Lower, outside	Lower, outside
Chemical Name					
1,1,1,2-TETRACHLOROETHANE	ND	590	ND	ND	ND
1,1,1-TRICHLOROETHANE	ND	390	ND	ND	ND
1,2,4-TRIMETHYLBENZENE	ND	3300 J	7700	ND	5300
1,3,5-TRIMETHYLBENZENE	ND	1700 J	3400	ND	2700
2-CHLOROTOLUENE	ND	360	750	ND	560
2-PHENYLBUTANE	ND	26000	ND	ND	ND
4-CHLOROTOLUENE	ND	ND	450	ND	ND
ACETONE	ND	ND	ND	77000 J	ND
DICHLOROMETHANE	34000 J	6900	ND	99000 J	4100
ETHYLBENZENE	83000	28000	12000	6400 J	45000
ISOPROPYLBENZENE	ND	1000 J	660	ND	1100
NAPHTHALENE	50000	39000	25000	25000 J	66000
N-BUTYLBENZENE	ND	ND	620	ND	ND
N-PROPYLBENZENE	ND	320	520	ND	440
STYRENE	ND	2400 J	880	ND	2100
TETRACHLOROETHENE (PCE)	3300000 EJ	1400000 J	1900000	17000000 J	5300000 J
TOLUENE	230000	2300000	160000	87000 J	210000
TRANS-1,3-DICHLOROPROPENE	ND	ND	ND	ND	4000
TRICHLOROETHYLENE (TCE)	ND	ND	1600	ND	970
m- &/or p-XYLENE	450000	160000	49000	31000 J	240000
o-XYLENE	280000	90000	23000	17000 J	130000
XYLENES (total) *	730000	250000	72000	48000	470000

Notes and Abbreviations:
Units = µg/kg
J = Estimated value below laboratory reporting limits
EJ = Result is reported from a dilution of the sample. Result reported is estimated.
ND = Not detected at or above laboratory reporting limits
* - total xylenes are presented as the sum of the m-, p-, and o-xylene results.

APPENDIX E

Winnegbago County Code
Article III

WINNEBAGO COUNTY CODE ARTICLE III

Water Supply and Service

DEPARTMENT OF PUBLIC HEALTH
WINNEBAGO COUNTY

Winnebago County Department of Public Health
401 Division Street
Rockford, Illinois 61104
(815)962-5092

November 1999

WINNEBAGO COUNTY
PRIVATE WATER WELL CODE

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DIVISION 1. DEFINITIONS

Sec. 86-106. Definition of Terms.
a) As used in this Ordinance, unless the context specifies otherwise:

ABANDONED WELL means a water or monitoring well which is no longer used to supply water, or which is in such a state of disrepair that the well or boring has the potential for transmitting contaminants into an aquifer or otherwise threatens the public health or safety.

APPLICANT means the owner as defined herein or his or its authorized agent.

AQUIFER means a water bearing formation that transmits water in sufficient quantity to supply a well.

DEPARTMENT means the Winnebago County Department of Public Health.

MODIFICATION means any change, replacement, or other alteration of a water well. This includes, but is not limited to, deepening of a well, installation of a pitless adapter, replacing or repairing a casing or a well screen, capping a well, and any other changes of a well structure. It does not include replacement of a pump or well cap.

MONITORING WELL means a water well intended for the purpose of determining groundwater quantity,

quality and/or piezometric measurements.

OWNER means the person or corporation or other legal entity in whose name the property appears on the records of the County Recorder.

POTABLE WATER means water that is bacteriologically and chemically safe for human consumption.

SHOCK CHLORINATION means a one-time addition of a disinfectant (bleach) in order to remove bacterial contamination from the water supply.

WATER WELL means any excavation that is drilled, cored, bored, washed, driven, dug, jetted or otherwise constructed when the intended use of such excavation is for the location, diversion, artificial recharge or acquisition of ground water, except monitoring wells.

WELL CAP means an arrangement or device used to establish a watertight gasket at the junction of a well pump or piping with the well casing cover at the upper terminal of the well, the purpose of which is to prevent contaminated water or other material from entering the well.

b) Terms not herein defined shall have the meaning customarily assigned to them, except for those terms defined elsewhere in this ordinance.

DIVISION 2. GENERAL PROVISIONS

Sec. 86-107. Private Water Supply Standards.
All private sources of water, as well as the distribution system of water shall be located, constructed, and maintained in strict conformance with this Division.

Sec. 86-108. Owner's Responsibility.
The owners of each building in which people live, work, or assemble shall provide a potable water supply sufficient in quality, quantity and pressure to adequately serve all fixtures therein.

Sec. 86-109. Building Occupancy.
No person shall occupy or permit occupancy of any building not in compliance with Section 86-108 of this Ordinance.

Sec. 86-110. Maintenance.
The owner of each private water supply system shall maintain all components of that system so that they function property and are in good repair.

Sec. 86-111.Public Water Supplies;When Required.
a) Where a public water supply main is within 200 feet, as measured along a public right-of-way or existing easement, of the property line of the property proposed to be served by a private well, no permit for such a well shall be issued and the property shall connect to the public water supply if water service is desired. Furthermore, no permit shall be

issued for a private well on any property which is already connected to and served by a public water system, except that non-residential properties may be permitted to install a well for non-potable purposes, provided it is approved by the appropriate water utility and the system complies with all applicable cross connection controls and ordinances.

b) The regulations imposed by subsection (a) of this Section shall not apply if, as a condition of connection to a public water supply, the owner of the property will be required to annex or to sign a pre-annexation agreement with any municipality, unless the owner voluntarily wishes to do so, excepting all industrial users.

Sec. 86-112. Individual Service.
Each residential property, business building, or enterprise shall be served by its own separate water well located on the property whereon it is located, except where the residence, building, or enterprise is connected to a community or public water supply.

DIVISION 3. ADOPTION OF ILLINOIS WATER WELL CONSTRUCTION CODE AND ILLINOIS WATER WELL PUMP INSTALLATION CODE.

Sec. 86-113. Adoption of State Codes.
The Illinois Water Well Code, 1994, and the Illinois Water Well Pump Installation Code, 1992, as now

enacted or hereafter amended, are adopted and incorporated by reference.

DIVISION 4. PERMIT REQUIREMENTS.

Sec. 86-114. General Provisions.

No person shall construct, modify, or cap a well until a permit for such work has been issued by the Department. Applications for permits shall be in writing on forms provided by the Department and shall be signed by the applicant. Permits are not transferable.

Sec. 86.115. Contractor Requirements.

All well drilling contractors, well pump installation contractors, and other authorized constructors of wells doing business in the County of Winnebago shall be licensed by the State of Illinois.

Sec. 86-116. Permit Fee.

The fee to construct or deepen a well shall be $100.00 and shall be paid to the Department prior to granting of a permit. There shall be no fee for otherwise modifying a well.

Sec. 86-117. Permit Application Requirements.

a) Application for a permit to construct a well shall be accompanied by a site plan drawn to scale and fully dimensioned with specifications as necessary to fully describe the system. The site plan shall indicate the locations of the following (existing or proposed):

(1) Location of the well in relation to two adjacent lot lines.
(2) Lot boundaries.
(3) Private sewage disposal systems or sanitary sewer lines.
(4) Buildings.
(5) Driveways.
(6) Sidewalks, decks and patios.
(7) Private sewage disposal systems and sewer lines on adjoining lots.
(8) Above or below ground swimming pools.

b) Application for a permit to modify a well shall be accompanied by a site plan drawing indicating the following:

(1) Lot boundaries.
(2) Location of the well in relation to two adjacent lot lines.
(3) Potential sources of contamination that may affect the well.

c) The permit application shall contain the following information:

(1) Property address.
(2) Contractor's name, license number and address.
(3) Name and address of property owner.
(4) Public water availability.
(5) Construction method of well (drilled, driven, other).
(6) Estimate of well depth and depth to bedrock.

(7) Type and expected use of well.
(8) Section, Township, Range, & Quarter Sections of well site.

Sec. 86-118. Expiration.
The permit shall be void if construction has not commenced within one year of the date of issuance. Any excavation or installation at the end of one year shall require an additional fee of $100.00. At no time shall any permit fee be returned.

Sec. 86-119. Inspection.
Department personnel shall have access to the property at any reasonable time after a permit application has been filed in order to determine satisfactory compliance with the provisions set forth in this ordinance. Access shall be deemed essential, but not limited, to the following:

1) Any stage of construction or modification of a system.
2) Final inspection.
3) Sampling of private water supply system.

Sec. 86-120. Notification.
The owner or contractor shall give 48 hours advance notice, exclusive of weekends and/or state holidays, to the Department before beginning the construction of a new well or the capping or sealing of an existing well except in emergencies in which case the contractor must provide notification during the next business day. Emergencies are defined as instances where loss of

water is experienced for any reason. No work on the water well shall be done until the notification is given. The owner or contractor shall give the Department as much notice as possible before beginning work to modify an existing water well. No work shall begin until the Department has been notified.

Sec. 86-121. Well Specification Log.

All persons digging, drilling, or driving wells shall maintain a log of the specifications of the constructed well which shall be submitted to the health officer of the county within 30 days of construction of each well.

DIVISION 5. CONSTRUCTION OF WELLS GENERALLY

Sec. 86-122. Location of Well Sites.

All well sites shall be located at a point of high elevation and as far removed from known possible sources of contamination as the general layout of the premises permit. Minimum distance between the well and sources of contamination shall be maintained as follows:

1. Dry wells or Class I injection wells.....200 feet
2. Cesspools.....150 feet
3. Subsurface seepage tile.....100 feet
4. Seepage pits.....100 feet
5. Privy vaults.....75 feet
6. Manure piles.....75 feet
7. Tile sewers and drains.....50 feet

8. Barnyard or animal confinement lots.....50 feet
9. Septic tanks.....50 feet
10. Cast iron sewers having leaded or mechanical joints.....10 feet
11. Potential contamination sources unspecified above must be evaluated for each particular instance and distances arrived at based on the pertinent facts.

Note: These distances listed apply only in clay and loam soils. In gravel and sand formations safe distances will be variable being greater than for clay or loam soils.

Refer to Illinois Water Well Construction Code for applicable minimum distances.

Sec. 86-123. Platforms.
Well platforms shall be of watertight, reinforced concrete placed on an earth fill higher than the natural grade.

Sec. 86-124. Casings.
Well casings shall terminate a minimum of eight (8) inches above the grade of the natural ground surface. Well casings for drilled wells shall be of not less than four (4) inches inside diameter. All well casing must be of new material.

Sec. 86-125. Wells in Basements.

New wells shall not be constructed in basements. An existing well located in a basement shall conform to the following conditions:

a) The casing shall extend a least twelve (12) inches above the basement floor or the highest known flood elevation, whichever is higher.

b) The well casing shall have a well seal which prevents contaminants from entering the well.

c) An approved floor drain or approved sump pump shall be provided.

Sec. 86-126. Wells with Buried Seals.
Existing wells with buried seals shall be acceptable until removal of the seal becomes necessary for any reason. At that time the well must be brought into compliance with this Ordinance or connection made to a community or public water supply as herein provided.

Sec. 86-127. Well Pits.
New wells shall not be constructed in pits. Existing pit installations may be accepted if the following conditions exist:

a) The well pit shall be structurally sound and watertight. The casing shall extend at least twelve (12) inches above the pit floor and have a well seal to prevent contamination from entering the well.

b) A watertight cover must be provided for the well pit.

Sec. 86-128. Pressure Tanks.
For each residential structure a pressure tank shall be installed. For buildings to be used for other than residential purposes, the minimum pressure storage capacity shall be consistent with the proposed use of the building. The pressure storage tank shall be installed in a location which is not subject to flooding and which is convenient for maintenance or replacement.

Sec. 86-129. Pumping Equipment.
A sanitary seal shall be provided for the annular space between the drop pipe and the casing. Pump room floors shall be of impervious construction and shall slope away from the pump pedestal. In every instance the pump base and the well casing, or well opening, shall be at least eight (8) inches above the floor.

Sec. 86-130. Pump Suction Lines.
All buried suction lines shall be enclosed in a pressure discharge line maintained at system pressure.

Sec. 86-131. Water Distribution Lines.
a.) The water supply shall not have a physical connection with any non-potable water supply. On new installations all water lines and sewer lines shall be not less than ten (10) feet apart horizontally and shall be separated by undisturbed earth.

b) Water and sewer lines shall not cross except where such condition cannot be reasonably avoided. At necessary crossings the water line shall be kept at least eighteen (18) inches above the top of the sewer line, while vertical separation shall be maintained at least ten (10) feet from the sewer line on each side of the crossing. The sewer shall be constructed of cast iron pipe with watertight joints for a distance of ten (10) feet from the water line.

Sec. 86-132. Backflow Protection

All plumbing fixtures and other equipment connected to the water supply lines shall be so constructed and installed as to safeguard the water supply from the possibility of contamination through cross connections or back siphoning.

Sec. 86-133. Unsafe Water Supply.

a) If water samples collected from a private water supply indicate the water to be bacteriologically unsafe, as determined by the Department, the supply will not be approved for use.

b) No water that has been condemned as unfit for human consumption after analysis shall be used for human consumption until the water supply has been declared safe by the Health Officer of the County.

Sec. 86-134. Disinfection.

a) Where a chemical injection system is directly connected to a water well system, it shall not permit

direct feeding of disinfectants or other chemicals into the aquifer through the well casing.

b) Disinfection of a source of water will not be accepted as a substitute for good sanitary practice including proper location and construction of water facilities.

Sec. 86-135. Abandonment of Wells.
Abandoned wells, borings, and monitoring wells shall be sealed in accordance with the requirements of the Illinois Department of Public Health. Abandoned water wells shall be sealed by a licensed water well driller. An individual who is not so licensed may seal a well, provided the well is located on land which is owned or leased by such individual for farming purposes or such person's place of abode and provided a request is made to the Department prior to the commencement of sealing indicating how the water well is to be sealed and the materials used. The Department shall approve the request provided the methods and materials are in compliance with State code requirements.

Sec. 86-136. Capping of Wells.
Wells with discontinued use, but intended to be brought back into service, and meeting all other provisions of this code, may be capped for a period not to exceed one year by written agreement with the Health Officer. Capped wells shall have the pump removed and a watertight cap or welded plate placed atop the casing. The casing of a capped well shall be

painted orange as an indication of status. Capped wells not brought into compliance with said agreement shall be properly sealed.

DIVISION 6. WATER QUALITY STANDARDS

Sec. 86-137. General Provisions.

For a private water supply to be deemed safe for use, it shall produce water of a quality consistent with the standards described in this Article. A safe water supply shall be considered that which has been sampled and approved in a manner consistent with the state water well code. Sampling of a shock chlorinated water supply shall be performed no less than ten days after chlorination to assure bacteriological conformance with Section 86-138.

Sec. 86-138. Microbiological Standards.

The following maximum contaminant level for coliform bacteria is applicable to all private water supply systems:

a) Colilert - When utilizing this technique, there shall be no positive indication of enzymatic activity defining the presence of coliform bacteria in the sample.

b) Membrane Filter - When utilizing this technique, there shall be no coliform bacteria present per 100 milliliters in the sample.

c) Fermentation Tube - When utilizing this technique (in either 10 or 100 milliliter standard portions), there shall be no indication of coliform bacteria present in any portion of the sample.

Sec. 86-139. Adoption of Other Water Quality Standards.

In addition to the microbiological standards described in Section 86-138 of this Ordinance, this Ordinance shall adopt, by reference, the water quality standards described in the Federal National Primary Drinking Water Regulations (40 CFR 141 and 142, 1988; 52 Federal Regulations 25690 through 25717, July 8, 1987; and 53 Federal Regulations 25801 through 25111, July 1, 1988) and any subsequent amendments or revisions thereto.

Sec. 86-140. Sampling Point.

Water samples shall be taken at points which are representative of the conditions within the distribution system. For non-potable wells, an easily accessible sampling point shall be provided.

DIVISION 7. ADMINISTRATION

Sec. 86-141. Enforcement.

Violations of this article shall be punishable as provided under Chapter I. Section 1-11 of the Winnebago County Code. The State's attorney may in addition bring action to restrain such action or enjoin the operation of any such persons.

Sec. 86-142. Revocation or Suspension of Permit. The Department shall have the authority to revoke or suspend permits when they are issued in error, or where the provisions of this Ordinance are violated. The reason for the revocation or suspension of a permit shall be posted in writing at the site, or mailed to the applicant at the address provided in the permit application.

Sec. 86-143.Interpretation, Purpose, and Conflict. The provisions of this Article shall be held to be the minimum requirements for the promotion of public health, safety, and general welfare.

a In any case where a provision of this Article is found to be in conflict with a provision of any zoning, building, safety, or health ordinance or code in force in the incorporated areas existing on the effective date of this Article, the provision which establishes the higher standard for the promotion and protection of the health and safety of the people shall prevail.

b. Should any section, clause, or provision of this Article be declared by a court of competent jurisdiction to be invalid, such decision shall not effect the validity of the Article as a whole or any part thereof, other than the part so declared to be invalid.

APPENDIX F

Groundwater Modeling for Pump and Treat Alternative

(approximately 40 percent of the targeted homes) during each sampling period in order to correlate groundwater concentrations with soil gas results.

All samples associated with the monitoring of the vapor intrusion pathway would be analyzed for VOCs including PCE, TCE, benzene, ethylbenzene, toluene, xylenes, acetone, methylene chloride, Freon 113, 2-butanone (methyl ethyl ketone), 1,1,1-TCA, cis-1,2-DCE and other breakdown products of PCE and TCE. The soil gas and indoor air monitoring could continue for two years until baseline indoor air and soil gas concentrations are established. This alternative assumes that monitoring of the vapor intrusion pathway would continue for five more years at approximately 10 homes or until it is confirmed that soil gas is not a threat. The frequency of sampling and the number of soil gas and indoor air samples and the soil and the shallow groundwater samples as well as sampling protocols would be similar to that used during the first two years.

Clearing, Grubbing, and Site Preparation

Minimal clearing, grubbing, and site preparation would be required for installation of the extraction wells and the associated treatment buildings. It is estimated that clearing and site preparation would last approximately one day at each treatment building location. This assumes that the U.S. EPA will be able to procure the land for siting the treatment buildings and necessary easements for the effluent pipeline.

Pump-and-Treat System

This alternative would use a pump-and-treat system to meet groundwater RAOs. A total of 23 extraction wells spaced throughout the extent of the plume would be used to aggressively remove contaminated groundwater from the plume. Figure 4-1 indicates the locations of the extraction wells, transfer piping, treatment buildings, and the outfalls for discharging the treated groundwater. The contaminated groundwater would be first withdrawn using extraction wells and then treated in

an aboveground treatment system. The various treatment systems would discharge to either the Dry Creek or the Rock River. Discharges at either location would meet the substantive requirements of NPDES permit and the Illinois effluent standards. A typical process flow schematic of the pump-and-treat system with air stripping is depicted in Figure 4-2.

The approximate extraction well spacing and pumping rates were determined with a capture zone analysis. The capture zone analysis was conducted by creating a groundwater flow model using the USGS computer code, MODFLOW. The Boss GMS, Version 3.1, software was used as a pre- and post-processor for MODFLOW. The site area modeled included the area within the contaminated groundwater plume representative of the VOC contamination extent observed during the 2000 RI and the 2002 Investigation and a flow system that approximated the existing hydraulic gradient across the site.

The groundwater model covered an area 10,500 feet by 17,000 feet, and used a uniform grid spacing of 50 feet. The model used two aquifer layers, both depicting the sand and gravel aquifer with a hydraulic conductivity of 3.8×10^{-2} cm/sec, as presented in the GDER, Revision 1 (WESTON, 2003). Both layers were modeled as 100 feet thick; however, only the saturated thickness of the uppermost layer was used in the flow calculations. The upper layer ranged in saturated thickness from 65 feet near the Rock River to 88 feet at the northern boundary, depending on the steady state water table elevation. The northern, or upgradient, boundary was modeled as a general head boundary, which allowed water to enter the system at a controlled rate, similar to natural conditions. The Rock River served as the southern, or downgradient model boundary. The Rock River was modeled using river nodes in the upper layer only. The eastern and western boundaries were modeled as no-flow boundaries, perpendicular to the direction of flow. The initial water table surface was modeled to have a gradient of 0.0015 ft/ft, as presented in the GDER, Revision 1 (WESTON, 2003).

Wells were added to the uppermost layer of the model and assigned various pumping rates, effectively mimicking partial penetration of wells. Particle tracking in the upper layer was performed using the MODPATH code through the Boss GMS, Version 3.1, pre- and post-processor software. Particle tracking was run in a backward fashion to estimate the radius of influence of a pumping well over a given period of time. Particles were located along the perimeter of the grid cells containing pumping wells. A specific yield/storativity value of 30% was used in particle tracking simulations. Various well layouts and pumping rates were simulated until an acceptable array of wells was obtained.

A well layout capable of approximately capturing the groundwater within the plume footprint area included 23 wells, each pumping at a rate of 500 gpm. Appendix C contains various figures associated with the capture zone analysis as well as water budget information supporting the model.

The Wellhead Protection Area (WHPA) delineation software (U.S. EPA, 1992) (full reference: U.S. EPA, 1992, WHPA - A Modular Semi-Analytical Model for the Delineation of Wellhead Protection Areas, version 2.1) was used in check the results obtained from MODFLOW. The WHPA software was used to model the extent of pumping influence for one of the wells proposed in the capture zone analysis. Although, WHPA is capable of calculating the extent of pumping influence over a given time period, it cannot simulate the effects of partial penetration of wells. Because partial penetration cannot be simulated with WHPA, the simulation was run using saturated thicknesses of 70 and 170 feet. The 70 foot thickness approximately corresponds to the upper layer in the capture zone analysis and the 170 foot thickness approximately corresponds to the full saturated thickness used in the capture zone analysis. The smaller saturated thickness is expected to overestimate the radius of influence while the larger saturated thickness is expected to underestimate the radius of influence. However, these results were intended to bracket the range of the expected radius of influence. Other input parameters for the simulation included a pumping rate of 500 gpm, a hydraulic conductivity of 3.8×10^{-2} cm/sec, a specific yield of 30%, and a pumping duration of 730 days (2 years). The results of the two WHPA simulations yielded a radius of influence that was between 650 and 1,000

feet. This range compares favorably with the output from the capture zone analysis performed with MODFLOW. Output from the two WHPA simulations is included in Appendix C.

The CAPZONE software code (Bair, et.al., 1992) (full reference: Bair, E. Scott, Abraham E. Springer, and George S. Roadcap, CAPZONE - An Analytical Ground-Water Flow Model , version 1.1, Ohio State University, Department of Geological Sciences, March 1992) was used to estimate the expected drawdown at the extraction wells. Input parameters were similar to those used for the WHPA simulations and included both the 70 and 170 foot saturated thicknesses. The result of pumping the smaller saturated thickness aquifer (70 ft) resulted in drawdown exceeding 25 feet. The result of pumping the thicker aquifer(170 ft), resulted in a drawdown of approximately 21 feet in the pumping well.

Based on the results of the 2000 and the 2002 investigations, the area of the contaminated groundwater plume area is approximately 555 acres (24.2 million ft^2) and the aquifer thickness is 70 ft with an average porosity of 30%. This yields approximately 3.8 billion gallons of contaminated water within the plume. The 23 extraction wells would pump at a total rate of 11,500 gpm (about 6 billion gallons per year) for approximately 2 years to extract all the contaminated water from within the plume. If this alternative is selected as the final remedy, aquifer pump tests and additional groundwater modeling would be required to finalize the design parameters for the extraction system.

Transfer pipes connecting the extraction wells to the treatment building and from the treatment buildings to the outfalls would be buried in the right-of-way (ROW) and/or on private properties and registered with the Roscoe Township such that they may be entered into the state utility database. The pipelines would be buried at least 3 ft deep for frost protection. The outfalls would require stabilization (i.e., using rip rap) to prevent erosion. The discharge pipe outlet would also require adequate protection from damage.

All treatment system components would be housed in a heated building. Air monitoring would be needed during system setup to verify that there are no fugitive emissions. After the system is setup, monthly air monitoring using an organic vapor monitor (OVM) would be conducted for system components during routine maintenance.

Pre-treatment would consist of a bag filter or an in-line screen to remove solids. Based on the low mass of volatile organic matter (VOM) that would be emitted (approximately 100 pounds per year) as estimated in Appendix E, off-gas treatment is not anticipated at this time. However, if required, a suitable off-gas treatment would be easily implementable. Initial air monitoring at the stack and the property line may be required to demonstrate that emission controls are not warranted. Air containing VOCs would be captured and treated, if necessary, using vapor phase carbon adsorption.

Air strippers would require periodic cleaning to remove scaling. Additionally, small quantities of metal (i.e., iron) sludge may require removal and disposal. Water treated by the treatment system would be discharged either to the Dry Creek or to the Rock River. Water will be discharged in accordance with the substantive requirements of a NPDES permit issued under the Clean Water Act and the Illinois Effluent Standards. appropriate regulations.

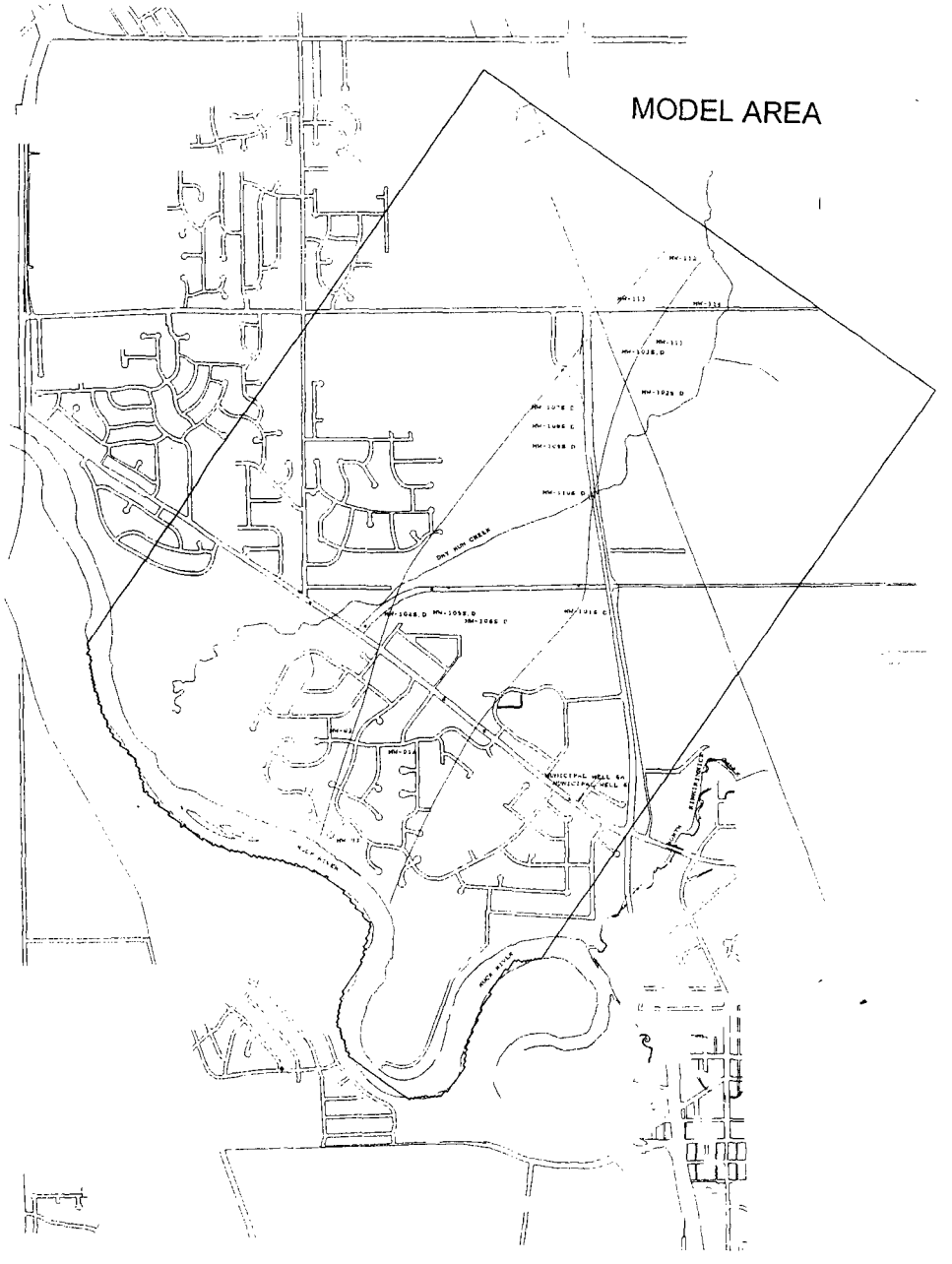
Verification samples from the influent and effluent streams of the air stripper would be collected on a quarterly basis to determine system loading and operating conditions and to ensure compliance with the permit effluent requirements.

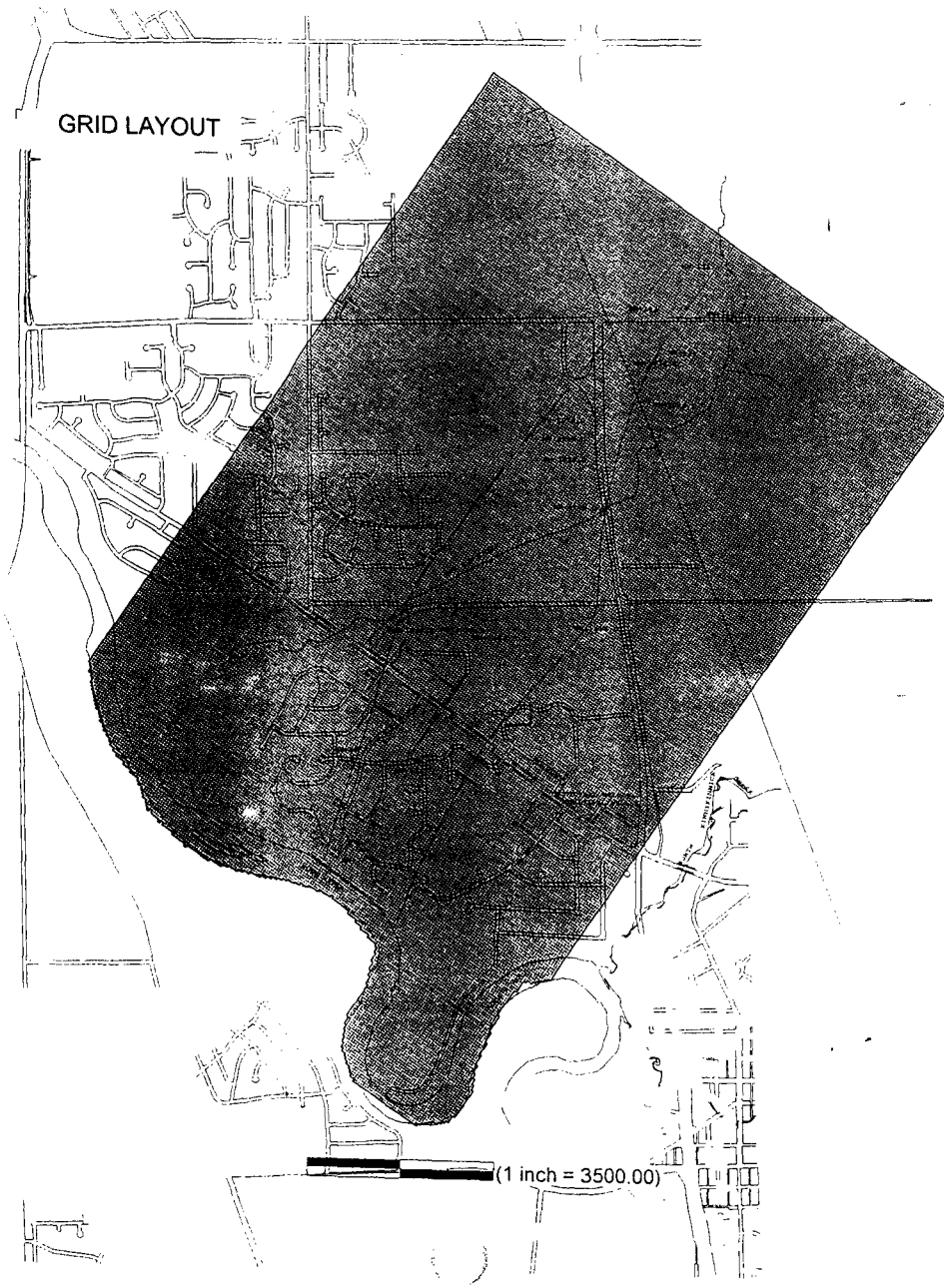
Estimated Time to Achieve Groundwater RAOs

The estimated time to achieve RAOs for groundwater is dependent on several factors including the time needed for the COCs to travel from the furthest contaminated area to the extraction wells, presence or absence of immiscible contaminants in the subsurface, porosity and hydraulic conductivity of the aquifer, tailing effects and retardation of contaminants, and other constraints

such as adsorption, preferential pathways, or low permeability zones. Based on the results of the 2000 and the 2002 investigations, the area of the contaminated groundwater plume area is approximately 555 acres (24.2 million ft^2) and the aquifer thickness is 70 ft with an average porosity of 30%. This yields approximately 3.8 billion gallons of water within the plume. Based on the results of preliminary groundwater modeling, discussed previously, 23 extraction wells, each pumping at a rate of 500 gpm, would be required to extract one pore volume (PV) of water which is the volume of groundwater with the known contamination plume.

Aquifer restoration requires that sufficient groundwater be flushed through the contaminated zone to remove both existing dissolved contaminants and those that will continue to desorb from porous media, dissolve from precipitates or NAPL, and/or diffuse from low permeability zones. Assuming linear, reversible, and instantaneous sorption, no NAPL or solid contaminants, and neglecting dispersion, the theoretical number of PVs required to remove a contaminant from a homogeneous aquifer is approximated by the retardation factor, R, which is the ground-water flow velocity relative to the contaminant velocity rates. Retardation factors for PCE and TCE were calculated to be approximately 1.34 and 1.97, respectively. Using these retardation factors, the theoretical number of PVs required for achieving the PCE and TCE MCL of 5 ug/L were calculated to be approximately 3.36 and 4 PVs, respectively. Detailed calculations for retardation factors and PVs are presented in Appendix D. Based on the foregoing discussion, approximately four PVs of contaminated groundwater would be extracted and treated. Therefore, the time required to achieve the RAOs would be approximately 8 years. However, the source(s) of contamination, whether multiple sources, extraneous sources, point source or continuing source, remain unknown, and additional effort may be warranted to address this issue. Also, a certain amount of uncertainty remains with respect to the current horizontal and vertical extent of the Evergreen Manor plume, and the remaining contaminant concentrations within the plume. If sources are present and if the horizontal and vertical extent of contamination is larger than currently known, the time required to achieve the RAOs may be longer than predicted.


MODEL AREA
Y
Z
X

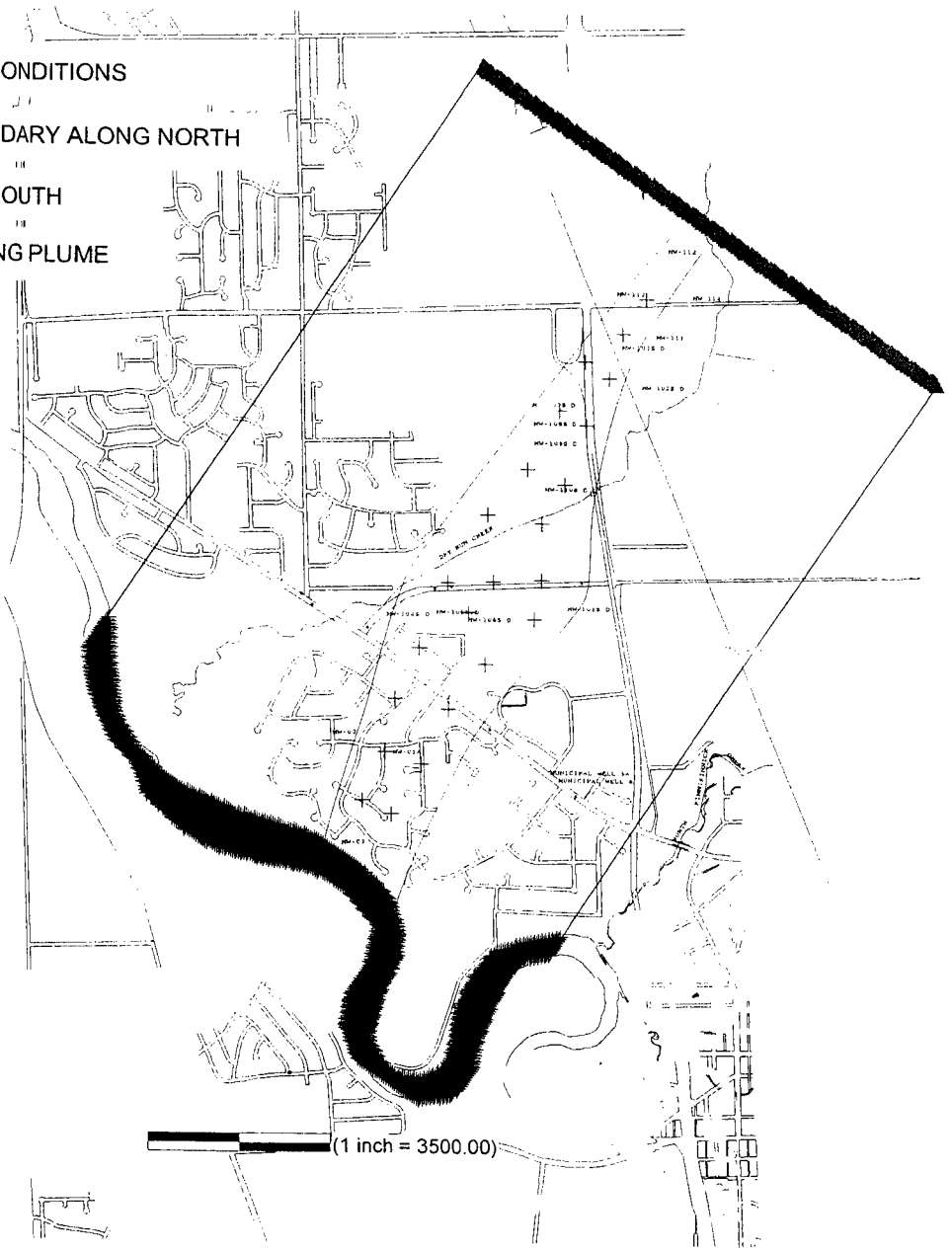

GRID LAYOUT
50'x50' CELLS
(1 inch = 3500.00)
Y
Z
X

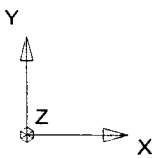
LAYER 1 - BOUNDARY CONDITIONS

GENERAL HEAD BOUNDARY ALONG NORTH

RIVER CELLS ALONG SOUTH

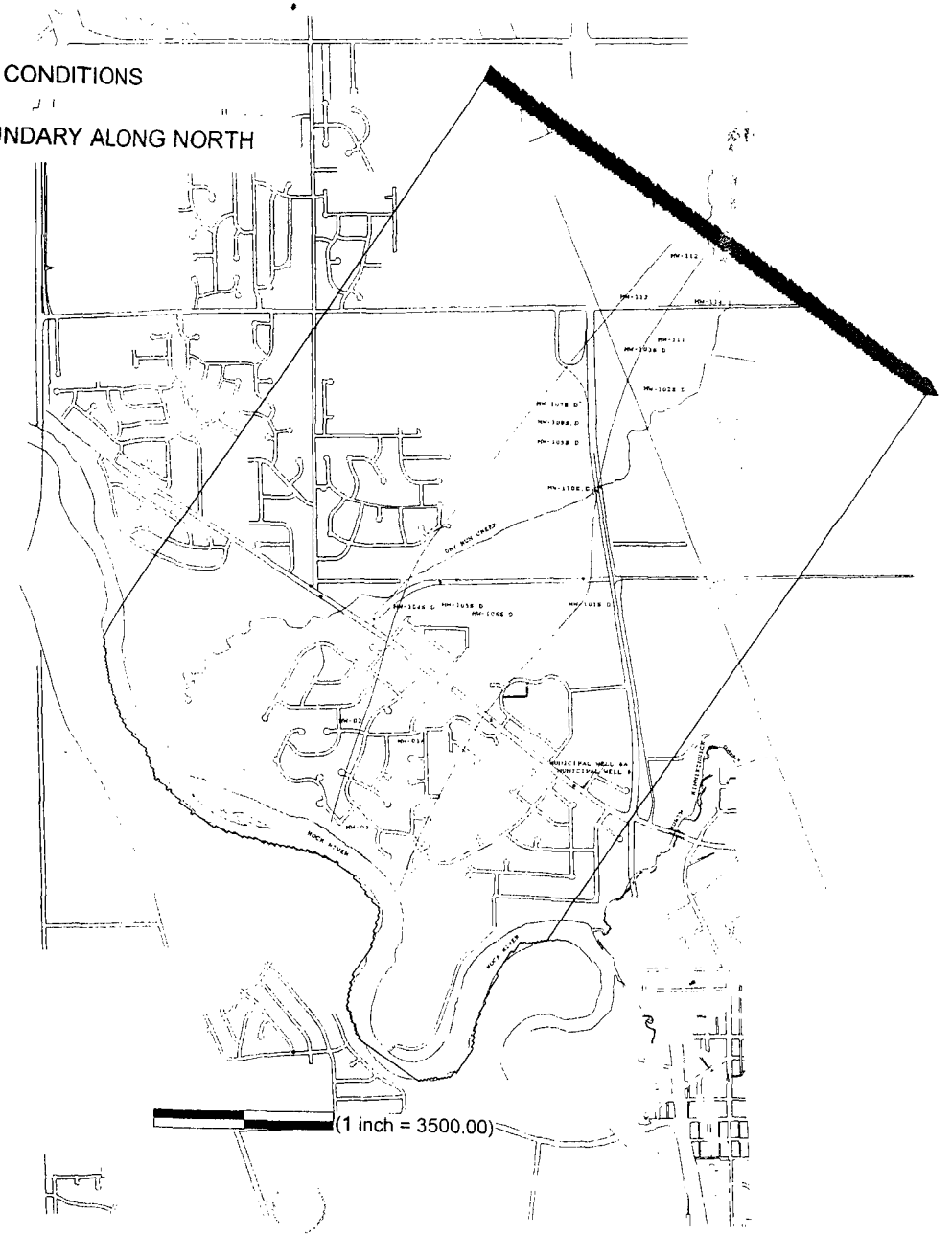
PUMPING WELLS ALONG PLUME

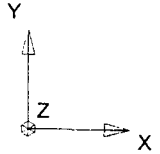




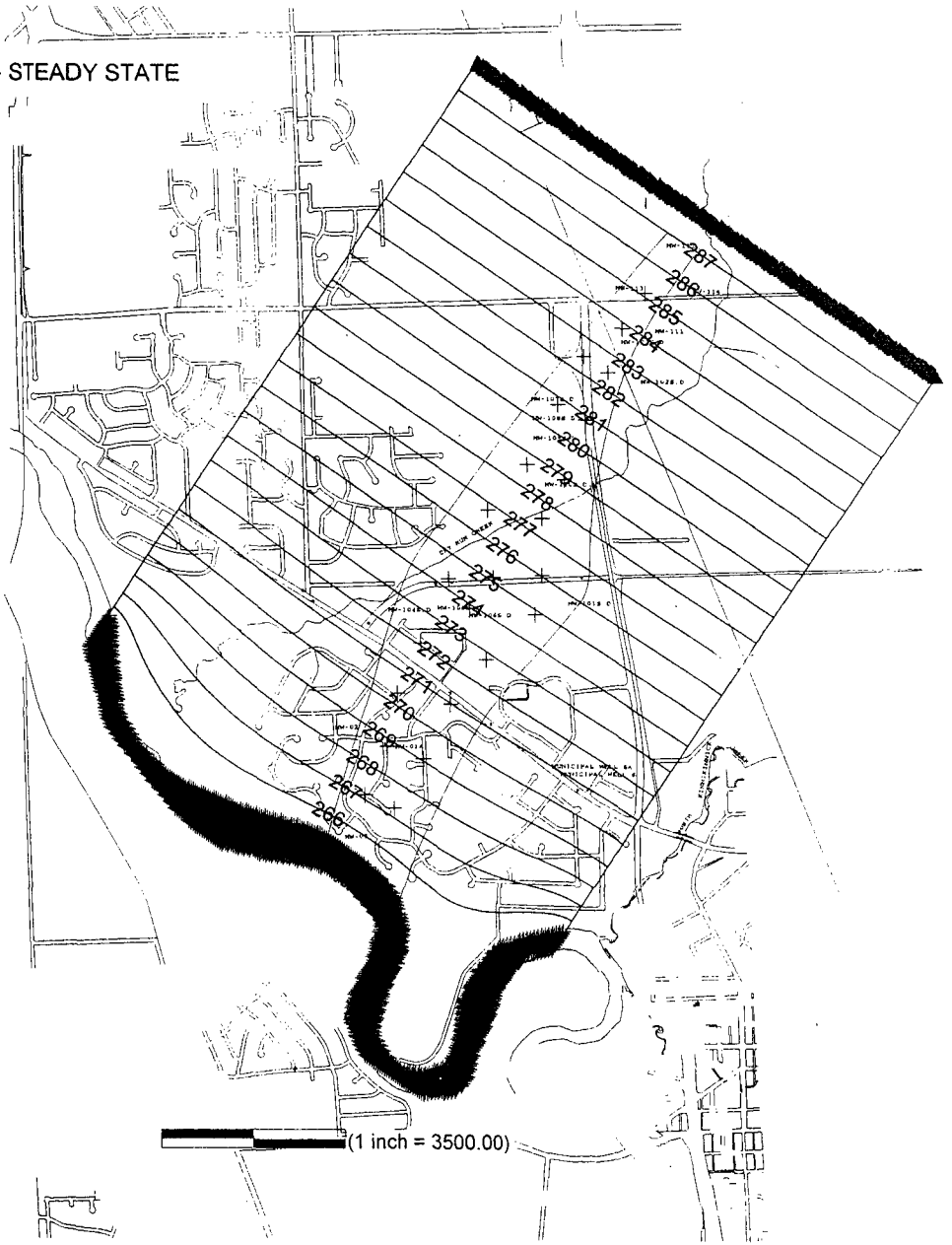
LAYER 2 - BOUNDARY CONDITIONS

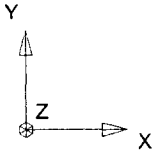
GENERAL HEAD BOUNDARY ALONG NORTH



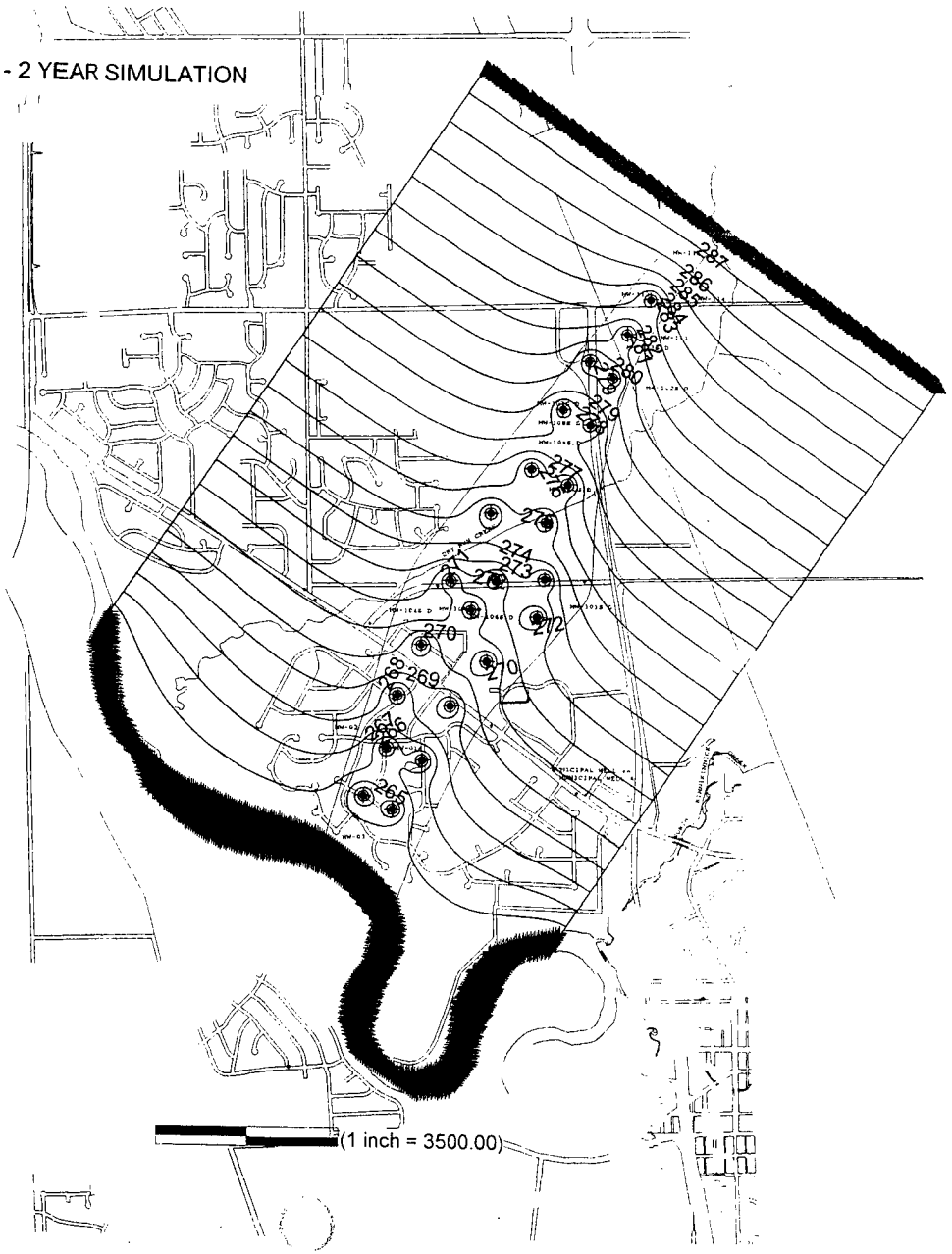


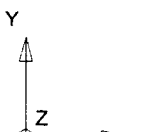
POTENTIOMETRIC MAP - STEADY STATE



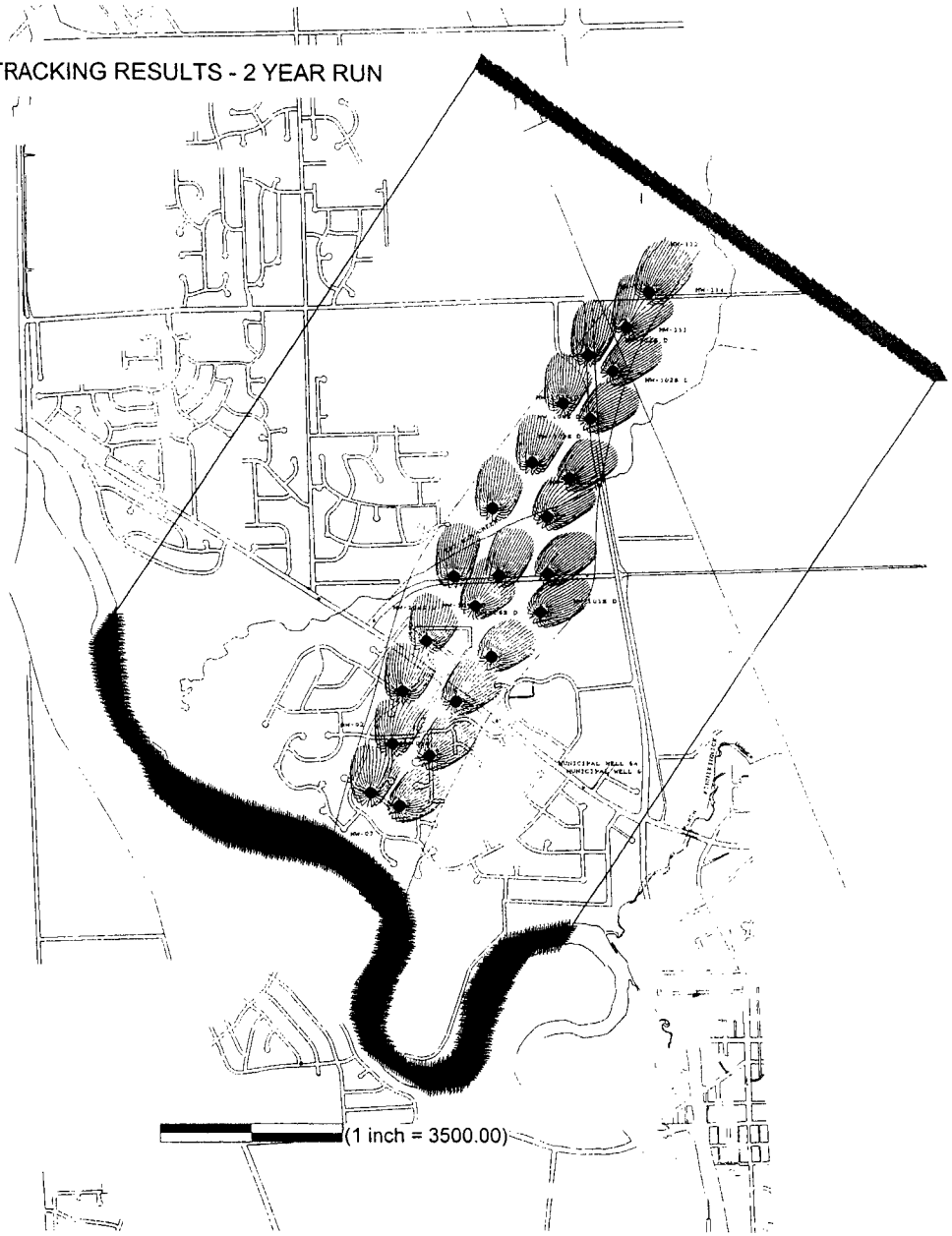


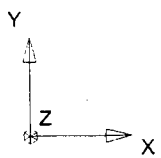
POTENTIOMETRIC MAP - 2 YEAR SIMULATION





BACKWARD PARTICLE TRACKING RESULTS - 2 YEAR RUN





WATER BUDGET FOR THE STEADY STATE SIMULATION

VOLUMETRIC BUDGET FOR ENTIRE MODEL AT END OF TIME STEP 1 IN STRESS PERIOD 1

CUMULATIVE VOLUMES	L**3	RATES FOR THIS TIME STEP	L**3/T
IN:		IN:	
CONSTANT HEAD =	3314246.0000	CONSTANT HEAD =	3314246.0000
WELLS =	0.0000	WELLS =	0.0000
TOTAL IN =	3314246.0000	TOTAL IN =	3314246.0000
OUT:		OUT:	
CONSTANT HEAD =	3314246.0000	CONSTANT HEAD =	3314246.0000
WELLS =	0.0000	WELLS =	0.0000
TOTAL OUT =	3314246.0000	TOTAL OUT =	3314246.0000
IN - OUT =	0.0000	IN - OUT =	0.0000
PERCENT DISCREPANCY =	0.00	PERCENT DISCREPANCY =	0.00

TIME SUMMARY AT END OF TIME STEP 1 IN STRESS PERIOD 1

	SECONDS	MINUTES	HOURS	DAYS	YEARS
TIME STEP LENGTH	86400.	1440.0	24.000	1.0000	2.73785E-03
STRESS PERIOD TIME	86400.	1440.0	24.000	1.0000	2.73785E-03
TOTAL TIME	86400.	1440.0	24.000	1.0000	2.73785E-03

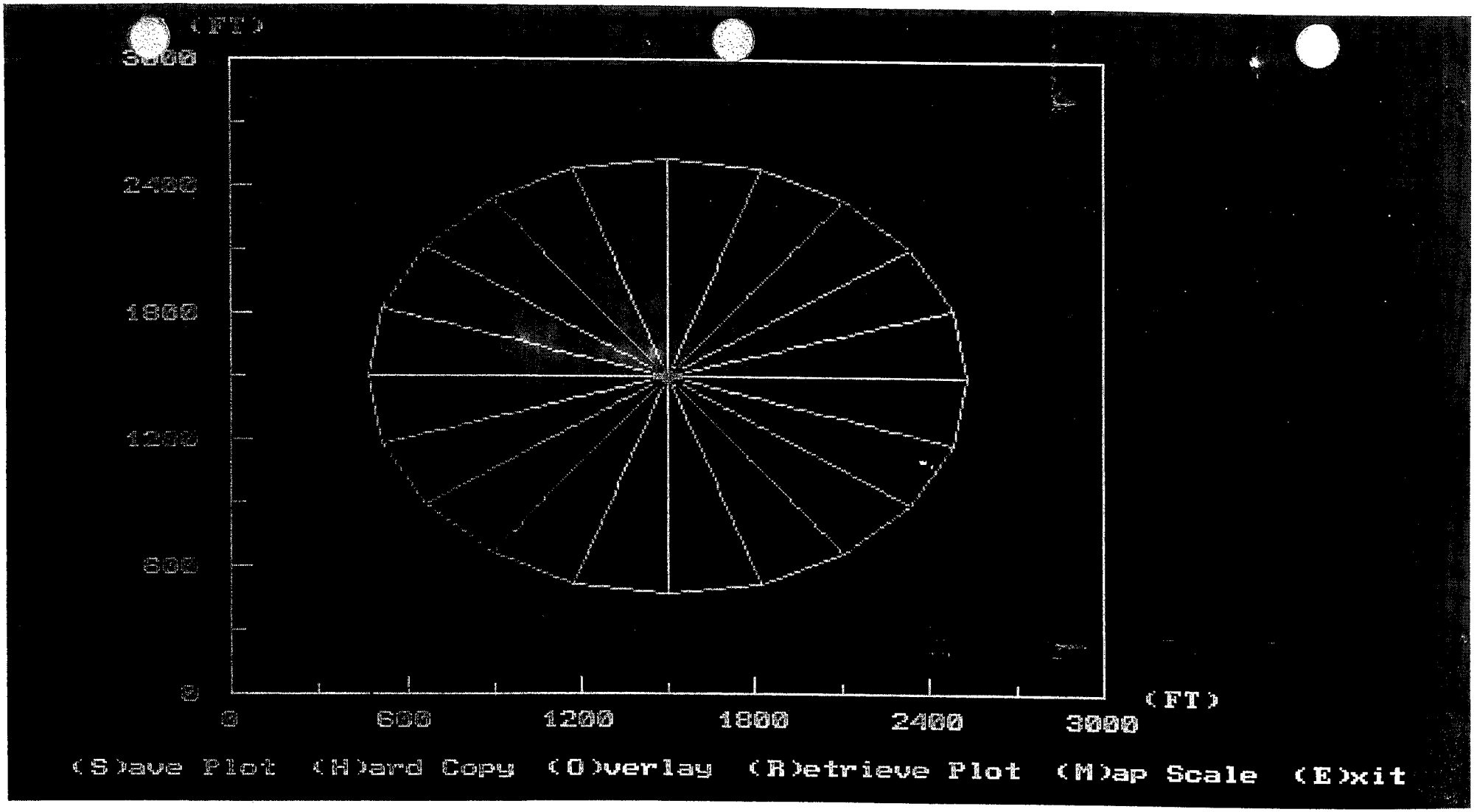
WATER BUDGET AT THE END OF TWO YEAR SIMULATION

VOLUMETRIC BUDGET FOR ENTIRE MODEL AT END OF TIME STEP 1 IN STRESS PERIOD 1

CUMULATIVE VOLUMES	L**3	RATES FOR THIS TIME STEP	L**3/T
IN:		IN:	
STORAGE =	1663069568.0000	STORAGE =	2278177.5000
CONSTANT HEAD =	0.0000	CONSTANT HEAD =	0.0000
WELLS =	0.0000	WELLS =	0.0000
RIVER LEAKAGE =	0.0000	RIVER LEAKAGE =	0.0000
HEAD DEP BOUNDS =	221329568.0000	HEAD DEP BOUNDS =	303191.1875
TOTAL IN =	1884399104.0000	TOTAL IN =	2581368.7500
OUT:		OUT:	
STORAGE =	44355492.0000	STORAGE =	60760.9453
CONSTANT HEAD =	0.0000	CONSTANT HEAD =	0.0000
WELLS =	1679000064.0000	WELLS =	2300000.0000
RIVER LEAKAGE =	161607072.0000	RIVER LEAKAGE =	221379.5469
HEAD DEP BOUNDS =	0.0000	HEAD DEP BOUNDS =	0.0000
TOTAL OUT =	1884962688.0000	TOTAL OUT =	2582140.5000
IN - OUT =	-563584.0000	IN - OUT =	-771.7500
PERCENT DISCREPANCY =	-0.03	PERCENT DISCREPANCY =	-0.03

TIME SUMMARY AT END OF TIME STEP 1 IN STRESS PERIOD 1

	SECONDS	MINUTES	HOURS	DAYS	YEARS
TIME STEP LENGTH	6.30720E+07	1.05120E+06	17520.	730.00	1.9986
STRESS PERIOD TIME	6.30720E+07	1.05120E+06	17520.	730.00	1.9986
TOTAL TIME	6.30720E+07	1.05120E+06	17520.	730.00	1.9986

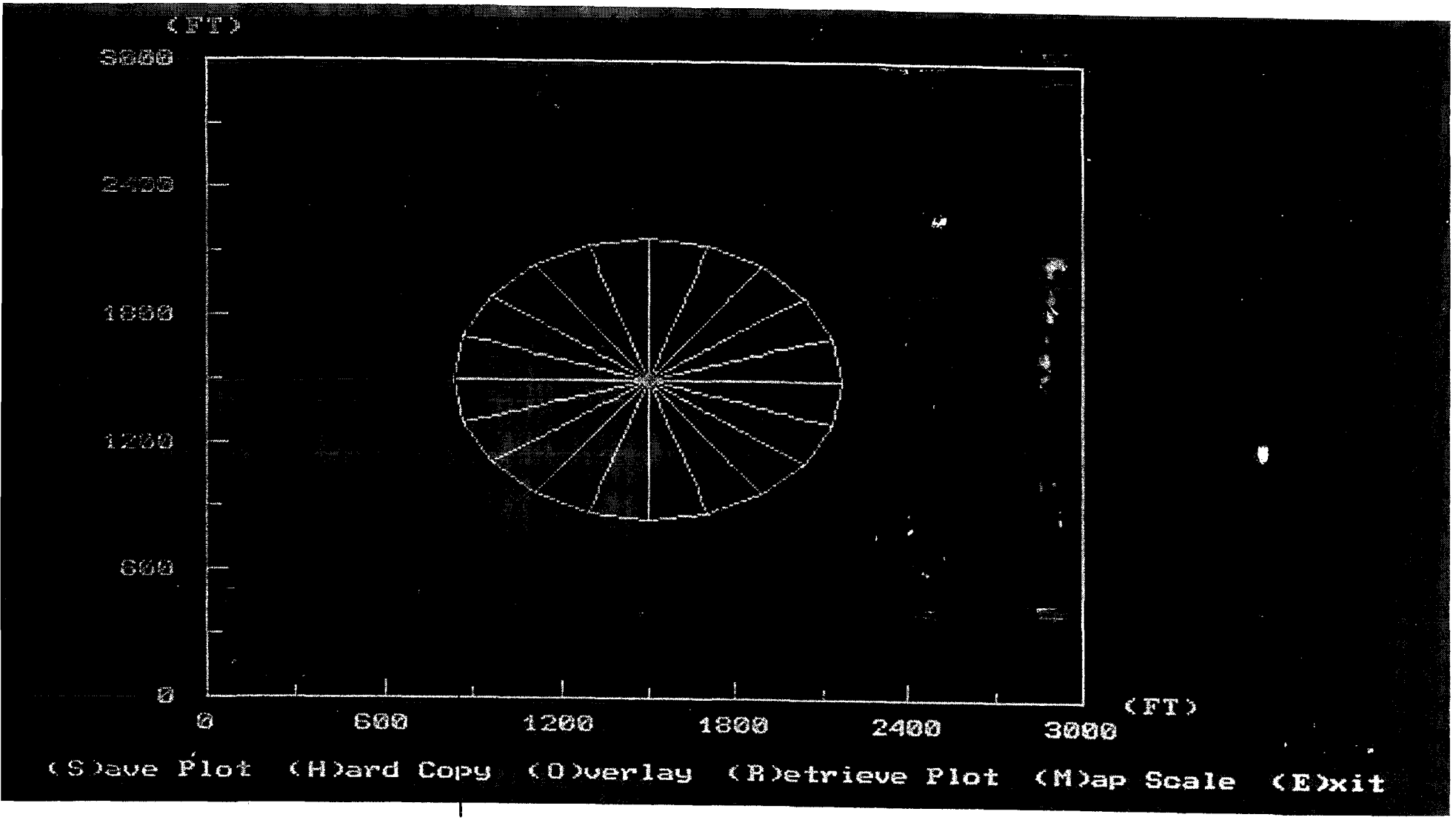


WHPA output

→ Capture zone → Well located at (1500, 1500) ; $T = 7539\ ft^2/d$; $Q = 500\ gpm = 96257\ ft^3/d$.

→ Run time = 730 days ; Aquifer thickness = 70 ft.

radius of influence ~ 6000 ft



WHPA output

$T = 18309\ ft^2/d$ $Q = 500\ gpm = 96257\ ft^3/d$

Run time = 730 d Aquifer thickness = 170 ft.

radius of influence ~ 650 ft.

WESTON SOLUTIONS

SHEET 1 of 2

CLIENT/SUBJECT U.S. EPA- Evergreen Manor W.O. NO. 20064.139.100

TASK DESCRIPTION Pore Vol. Calculation of TCE for FS TASK NO. 1220

PREPARED BY YH DEPT 1154 DATE 7/21/03

MATH CHECK BY ____ DEPT ____ DATE ____

METHOD REV. BY ____ DEPT ____ DATE ____

APPROVED BY ____ DEPT ____ DATE ____

<TCE>

Assumptions

- Initial Concentration (C_o) = 7.2 µg/L (2002 MW-03 data)
- Target Concentration (C) = 5.0 µg/L

$$\frac{C}{C_o} = \frac{5}{7.2} = 0.694$$

- Adsorption Coefficent (K_{oc}) = 95.5 (L/kg) for TCE (From 2000 RI, WESTON 2001)
- Porosity (n) = 30% or 0.3
- Bulk Density (ρ_b) = 1.8 kg/L (Illinois Administrati Code for sand
- Fraction of Organic Carbon (f_{oc}) = 0.0006

Retardation Factor (R) can be obtained by the following equation:

$$R = 1 + \frac{\rho_b}{n} \times f_{oc} \times K_{oc}$$

$$= 1 + \frac{1.8\ kg/L}{0.3} \times 0.0006 \times 95.5\ (L/kg)$$

$$= 1.3438$$

Pore Volume (PV) can be calculated by the following equation:

$$PV = PV_{R=1} \times R$$ (Newell et. al., 1994*)

CLIENT/SUBJECT U.S.EPA - Evergreen Manor W.O. NO. 20064.139.100

TASK DESCRIPTION Pore volume calculation - TCE TASK NO. 1220

PREPARED BY YH DEPT 1154 DATE 7/21/03

MATH CHECK BY _____ DEPT _____ DATE _____

METHOD REV. BY _____ DEPT _____ DATE _____

APPROVED BY

DEPT _____ DATE _____

<TCE> (continued) where $PV_{R=1}$ = Pore volumes required for the case where R = 1 or no retardation.

From $\frac{C}{C_0} = 0.694$, $PV_{R=1} = 2.5$

(Newell et.al., 1994*)

From the earlier calculation, R = 1.3438.

Therefore PV = 2.5 x 1.3438

= 3.36 Pore volumes

* C.J. Newell, R.L. Bowers, and H.S. Rifai. 1994 "Impact of Non-Aqueous Phase Liquids (NAPLs) on Groundwater Remediation." Summer National AICHE Meeting August 16, 1994 Symposium 23, "Multimedia Pollutant Transport Models."

WESTON SOLUTIONS

SHEET 1 of 1

CLIENT/SUBJECT U.S. EPA - Evergreen Manor W.O. NO. 20064.139.100

TASK DESCRIPTION Pore Vol. Calculation of PCE for ES TASK NO. 1220

PREPARED BY YH DEPT 1154 DATE 7/21/03 | APPROVED BY

MATH CHECK BY _____ DEPT _____ DATE _____

METHOD REV. BY _____ DEPT _____ DATE _____ | DEPT _____ DATE _____

<PCE>

Assumptions :

- Initial Concentration (Co) = 5.9 µg/L (2002 MW-103Sda
- Target Concentration (Cc) = 5 µg/L

$$\frac{C}{Co} = \frac{5}{5.9} = 0.847$$

- Koc = 269.19 (L/kg) for PCE (From 2000 RI, WESTON 200
- n = 30% or 0.3
- ρ_b = 1.8 kg/L (from IAC)
- foc = 0.0006

$$R = 1 + \frac{\rho_b}{n} + foc \times Koc$$

$$= 1 + \frac{1.8\ kg/L}{0.3} \times 0.0006 \times 269.19\ (L/kg)$$

$$= 1.969$$

$PV = PV_{R=1} \times R$ (Newell et. al., 1994*)

where $PV_{R=1} = 2$ at $\frac{C}{Co} = 0.847$ (Newell et. al., 1994)

$PV = 2 \times 1.969 = 3.938 \approx 4$ Pore volumes

APPENDIX G

Data Gaps/Uncertainties and Recommendations

6.4 HORIZONTAL AND VERTICAL EXTENT OF GROUNDWATER PLUME BOUNDARIES

A certain amount of uncertainty remains with respect to the current horizontal and vertical extent of the Evergreen Manor plume, and the remaining contaminant concentrations within the plume. This is especially true for shallow groundwater which, for the most part, has not been characterized within the residential area, but which poses the greatest risk to residents via the vapor intrusion pathway. Similarly, the location of the center of the plume, horizontally and vertically, is also unclear.

Although same-location sampling data, where available, show significant decreases in contaminant concentrations over time, actual concentrations in other areas of the plume could be somewhat higher than those indicated by the current monitoring well network and CPT sampling, which only provide limited horizontal and vertical data points. Additionally, these data points may not be located in the area and/or zones of highest contamination.

This uncertainty is relevant in terms of where and at what levels chemicals may migrate into homes via the vapor intrusion pathway; whether current or future well supplies are or may be impacted; and whether any chemicals are migrating under and beyond the Rock River.

Uncertainty is also introduced when attempting to correlate vertical groundwater VOC data between nearby wells (both residential and monitoring wells) from differing time periods. An important issue noted during the course of this data evaluation relates to the differences in the screening intervals of the residential and monitoring wells over different time periods. Groundwater data collected from 1990 to 1993 and the majority of the groundwater data collected from 1994 to 1999 have been derived from residential wells, most of which are screened from 65 feet to 80 feet bgs. However, no information regarding the exact locations or addresses of these wells is available. In addition, the record does not show the elevation of ground surface, making it difficult to determine which interval is the most contaminated. For example, if TCE is detected at 50 µg/L at Residence A but the

concentration of TCE is only 14 µg/L in the adjacent Residence B, the difference may be caused by the screening depths of the wells or by a sharp concentration gradient in a horizontal direction. Since these data points (residential wells) no longer exist, these data cannot be collected in the future. In contrast, most groundwater data collected during recent investigations have been derived from monitoring wells which are screened at various depths ranging from 21 bgs to 100 feet bgs. This large difference in the screened intervals of the residential and monitoring wells could lead to misinterpretation of actual groundwater trends. Some of the remaining data gaps and uncertainties at the site are discussed below :

- During the 2002 Investigation, low levels of TCE (less than 1 µg/L) were found in MW-101S and in MW-101D at 1.8 µg/L. TCE was at also detected in these wells at 3.7 µg/L in MW-101S and at 3 µg/L in MW-101D during the 1994-1999 investigations. However, no groundwater samples were collected from the nearby CPT-07, CPT-08 or CPT-13 sampling locations due to shallow refusal upon multiple attempts at each of these locations. Therefore, it is uncertain whether, and at what depths and concentrations, any groundwater contamination remains in this area.

- During the 1990 to1993 investigation activities, TCE was detected at 9 and 1 µg/L in samples collected from two residential wells located on Degroff Street. Degroff Street is located north of McCurry Road off of Route 251. No other data are available or have been collected in this area. As a result, it is uncertain whether, and at what depths and concentrations any groundwater contamination remains in this area, and whether any residential wells in this area are being impacted.

- During the 2000 and 2002 investigation, TCE was detected in MW-109D. TCE was also detected in MW-112, MW-108S, MW-108D, MW-109S, MW-109D, MW-110S, and MW-110D during the 1994 to1999 investigations. During the same time period, PCE was also detected in MW-107S, MW-107D, MW-103S, MW-103D, MW-109S, and MW-109D. Based on the limited number of horizontal and vertical sampling points over this one mile area, it is uncertain whether, and at what concentrations any groundwater contamination remains in this area.

- During the 1990 to1993 investigations, the maximum TCE concentrations were detected at a home located on Mathew Avenue at 33 to 56 µg/L. In November 1993, the TCE concentration was 20 µg/L. On the other side of the street, at another home on Mathew Avenue, TCE concentrations were 62 µg/L in 1991, 25 µg/L in 1993, 13 µg/L in 1996 and 8 µg/L in 1998. The closest monitoring wells to these homes are

MW-106S and MW-106D. However, TCE was not detected in MW-106D when it was sampled in 1994-1995, and only 3 µg/L was detected in MW-106S in 1994-1995. MW-105S and MW-105D, which are also nearby, but located closer to homes with less TCE, had no TCE in the shallower well in 1994-1995, but 15 µg/L TCE in the deeper well. Both MW-105 and MW-106 are screened from 55 to 65 ft-bgs and 90 to 100 ft-bgs. However, most of the residential wells in the area are believed to be screened between 60 and 80 ft-bgs. Although uncertainty exists in this area upon trying to correlate the data, the area around MW-105 and MW-106 has not been vertically profiled and MW-105 and MW-106 may not be appropriately located to characterize the horizontal and vertical extent of any remaining groundwater contamination in this area.

- Monitoring well MW-01A was first installed and sampled in 2002 and is located at the intersection of Blue Spruce Drive and Straw Lane, an area where some of the highest TCE concentrations in groundwater have been observed in the past. During the 1990 to1993 residential well sampling events, some of the highest TCE concentrations were detected in samples collected from five residential wells near Blue Spruce Drive and Straw Lane in the immediate vicinity of monitoring well MW-01A. Subsequent sampling of these residences during the 1994-1999 investigation events indicated a marked decline in TCE concentrations in all wells. This declining trend, consistent with historical sampling results, was also observed during the 2002 sampling of MW-01A. Nevertheless, the area around MW-01A may not be appropriately located to facilitate characterization of the horizontal or vertical extent of any remaining groundwater contamination in this area.

- No chlorinated solvents were detected in CPT-05 which was sampled at 35, 43, 51, 57, 69.5, 78 and 87 ft-bgs. CPT-05 was located in the upgradient direction of MW-105S and MW-105D. PCE and TCE were detected in MW-105S (screened from 55 to 65 ft-bgs) at concentrations ranging from 3.1 to 3.5 µg/L and 1.6 to 1.7 µg/L , respectively. PCE and TCE were also detected in the deep well (screened from 90 to 100 ft-bgs) at 3.2 and 2.8 µg/L, respectively. CPT-10, which also appears to be upgradient of the highest areas of contamination in 1991, had low levels of PCE and 1,1,1-TCA (less than 1 µg/L) in the 55 and 60 ft. intervals, and no chlorinated solvents in the 73 or 90 foot intervals. Also, no chlorinated solvents were detected in CPT-06, just east of CPT-10, which was sampled at 42, 53, 62, 74, and 85 ft-bgs. CPT-10, while in the plume, may only be on the edge of the plume. Since CPT-05, CPT-10 and CPT-06 are all located about 600 feet apart from each other, the horizontal and vertical extent of contamination in the area between CPT-10 and CPT-05 and in the area between CPT-10 and CPT-06 is unknown.

- Low levels of 1,1,1-TCA, PCE and TCE (less than 1 µg/L) were detected in MW-104S (50 to 60 ft-bgs) and MW-104D (90 to 100 ft-bgs). However, no chlorinated solvents were detected in upgradient CPT-04 sampled at 32, 46, 56, 71, 78, 84 and 93 ft-bgs; or in CPT-09 sampled at 35, 45, 55, 68, 75 and 85 ft-bgs. This leads to uncertainty in correlating analytical results as well as expected groundwater flow patterns.

- According to the 1991 sampling, the highest TCE concentrations in the downgradient end of the plume are near Wagon Lane and Tanawingo. These locations are between CPT-03 and CPT-01, and about 300 feet from CPT-01/MW-03 where low levels of TCE were detected in 2000 and 2002. CPT-01 and MW-03, while in the plume, may only be on the edge of the plume, not in the center. Therefore, the horizontal and vertical extent of contamination in this area, where some of the highest TCE concentrations have been observed in the downgradient end of the plume, remains uncertain.

- Low levels of PCE (less than 1 µg/L) were found in MW-108D (55 to 65 ft-bgs), MW-107S (35 to 45 ft-bgs) at less than 1 µg/L, MW-107D (55 to 65 ft-bgs) at 3.3 µg/L, MW-109S (40 to 50 ft-bgs) at 1.6 µg/L and MW-109D (60 to 70 ft-bgs) at 2.6 µg/L, but no chlorinated solvents were found in nearby CPT-12 sampled at 45, 62, 70, 81, 93, 102 and 118 ft-bgs, and only low levels of 1,1,1-TCA (0.7 to 3 µg/L) were found in CPT-11 in the 81, 93, 102 and 125 foot bgs samples. Although uncertainty remains when correlating these data, CPT-11 and CPT-12 are about 500 feet from each other, and are each about 400 feet from MW-107, MW-108 and MW-109. Also, MW-107, MW-108, MW-109 and the area to the west and south of these locations, has not been vertically profiled. As a result, MW-107, MW-108 and MW-109 may not be appropriately located in order to characterize the horizontal and vertical extent of any remaining groundwater contamination in this area.

- As described previously under data gaps related to hydrostratigraphy, the thickness of the shallow sand and gravel aquifer encountered beneath the site has been estimated at approximately 220 feet (approximately 735 feet amsl to 515 feet amsl), or greater based on municipal well logs. The screen intervals for the now abandoned residential wells were believed to have been situated at depths ranging from approximately 720 feet amsl to 655 feet amsl. The monitoring wells installed from 1994 through 2002 have been screened at various depths in an attempt to provide additional vertical distribution data of the plume, however the maximum depth of these wells extends to 651 feet amsl. The groundwater samples collected via CPT were obtained from a maximum depth of 630 feet amsl. A comparison of the aquifer thickness to the maximum depth at which groundwater samples have, or can be

sampled, indicates that a minimum of 115 feet of the aquifer has not been characterized for VOC contamination.

In order to address these uncertainties, additional vertical profiling using temporary well point sampling, may be required. The information obtained from the vertical profiling should also be used to evaluate the adequacy of the existing monitoring well network for use in a long-term monitoring program. Additionally, results of vertical profiling should be used to identify horizontal and vertical areas where additional monitoring wells are needed. This is discussed in more detail in Section 7.

6.5 VAPOR MIGRATION PATHWAY

One of the objective of the Air Sampling investigation (WESTON, 2003a) was to relate the presence of VOCs in groundwater, both proximate and distant, to the areas of soil gas and indoor air sampling. Based on the groundwater and air data evaluated in that study, there may be a correlation between some constituents detected in groundwater and corresponding constituents detected in soil gas. However, due to many factors, there remains some uncertainty as to whether a direct correlation exists between contaminants found in groundwater and soil gas samples. Fate and transport mechanisms are not well documented at the site and introduce a degree of uncertainty. In general, environmental transport involves the movement of gases, liquids, and solids within a given medium and across interfaces between air and water. Fate and transport mechanisms can usually be simplified into four basic categories: emission (at what rate contaminants are entering the medium); advection (direction and rate of migration through a medium); dispersion (spreading of contaminants), and attenuation (degree of buffering or attenuation). Each of these mechanisms are documented to different degrees at the Evergreen Manor site and increase the level of uncertainty.

Additionally, the rate and amount of migration of VOCs across the groundwater to soil vapor interface, migration through soil, and subsequent vapor intrusion indoors is also subject to many factors. Vapor-phase levels will be subject to change based on any or all of the following factors,

some of which are chemical-specific and some of which are site-specific. Some chemical specific factors for which little data are available include water solubility, vapor pressure, Henry's Law constant, organic carbon partition coefficient, degradation rates, etc. Site-specific factors include the following:

- Variations in subsurface physical properties such as temperature, soil porosity, bulk density, and moisture content.

- Ambient air temperature conditions, wind speed, and direction.

- Hydrogeologic characteristics, such as depth to water table, hydraulic gradients, seasonal fluctuations, flow rates, aquifer vadose zone permeability, presence/absence of confining layers, and recharge/discharge zones.

- The presence and/or magnitude of barriers to indoor vapor intrusion could cause soil gas and/or indoor air levels of a given VOC to vary. This includes both natural features and manmade objects. Winter frostline depths are variable and may also act as temporary barriers and alter normal air flow patterns towards negative pressure zones, such as basements. Similarly, the presence of higher-permeability channels (e.g., utility conduits) or ground cover (vegetation vs. paved surfaces) may induce channeling effect of vapors along preferential flow path.

- Although not expected to be a significant factor based on the relatively uniform lithology at the site, it is also possible that VOCs could migrate laterally through the vadose zone from more distant areas of the plume with higher concentrations towards area residences. Some or all of the factors described in the preceding bullets may induce this type of migration.

- The vertical distribution of contaminants is not consistently documented. Only CPT groundwater locations during the 2000 RI were vertically profiled resulting in a higher degree of confidence about the vertical distribution of contaminants in the water column only in certain areas. Residential wells and monitoring wells result in discrete sampling depths. Usually the screened zones are selected such that the highest permeability strata are open to the well, theoretically yielding the highest levels of contaminants since these represent preferential flow paths within the aquifer; however, there remains the potential that contaminants located above the screened zones (therefore not necessarily represented in the analytical data) may migrate to the vapor phase. Additional uncertainty arises from the fact that the shallow groundwater (at watertable) characterization at the Evergreen Manor site is

not complete because the focus of previous investigations was on the characterization of relatively deeper portions of the aquifer rather than the shallow portion (vadose zone and water table, approximately < 30 feet bgs). This lack of data in the shallow aquifers increases the uncertainty in the behavior of volatiles that may originate in the unsaturated zone.

In addition to the uncertainty factors discussed above, some analytical data gaps and limitations that may add to the level of uncertainty also exist. Limited groundwater characterization work has been performed during the 2002 investigation. Only three groundwater data points were installed in selected sections of the residential area; therefore, a large, current sample population within the residential area of the site does not exist. Since these three 2002 groundwater sample locations were selected in conjunction with air sampling zones, the level of uncertainty is deemed insignificant in the immediate vicinity of this recent work, and groundwater characterization for the purpose of air quality evaluation is deemed adequate. This is reinforced by the expectation that the predominant vapor migration direction is vertical from the water table towards the surface based on the presence of uniform permeability sand and gravel throughout the vadose zone and on the lack of any documented confining silt/clay layers. An exception exists in that these wells were screened below the water table and were designed to mimic and evaluate previous residential well constructions (i.e., draw water from depth horizons similar to former residential wells). Also, the highest levels of PCE and TCE concentrations in soil gas were found in an area where the some of the lowest levels of groundwater contamination have been observed. The highest soil gas levels of PCE (190 $\mu g/m^3$) and TCE (9.5 $\mu g/m^3$) were found in a residence near Wagon Lane and Wagon Lane Court located in an area where PCE and TCE concentrations have been historically low. In 1993, TCE concentration in the groundwater sample collected from this residence was reported at 3 µg/L. In 1991, TCE concentrations in samples collected from the surrounding homes were also reported as less than 5 µg/L. PCE was not detected in any of these homes. During the 2000 RI, TCE concentration in the groundwater sample collected from another residential well located near Wagon Lane and Wagon Lane Court was reported as 0.7 µg/L. Again, no PCE was reported. In 2002, both PCE and TCE concentrations in the nearby monitoring well MW-02 (screened from 65 to 70 ft-bgs) were reported

as non-detect. In order to evaluate whether contaminants in groundwater could be the source of contaminants in air that could theoretically result in vapor intrusion risks of 1×10^{-4}, groundwater concentrations were calculated using the equation provided in the *Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils* (U. S. EPA, 2002b). The calculated groundwater concentrations are presented in Table 6-1. The results show that theoretically, relatively higher groundwater concentrations than those observed would be needed to correspond to a vapor intrusion risk of 1×10^{-4}. For example, theoretically, PCE concentrations in water would have to be 110 µg/L to correspond to indoor air and soil gas concentrations of 81 $\mu g/m^3$ and 810 $\mu g/m^3$ respectively. TCE concentrations in groundwater would theoretically have to be 5.2 µg/L to correspond to indoor air and soil gas concentrations of 2.2 $\mu g/m^3$ and 22 $\mu g/m^3$, respectively. Thus, for the observed PCE and TCE concentrations in groundwater, the corresponding concentrations in soil gas are much higher than the expected theoretical values. Therefore, there is a possibility that contaminants that have not been characterized or quantified may be present near the water table surface or in the vadose zone in these areas, and a vapor migration potential may exist there.

In order to mitigate the above uncertainties, the extent of soil gas and shallow groundwater contamination should be characterized throughout the subdivisions. The soil gas and indoor air monitoring program should target a statistically significant number of homes. The initial sampling should target homes in areas that, historically, have had the highest levels of groundwater contamination (e.g., those along the centerline of the plume), homes in areas where relatively lower level of contamination has been observed and homes that lie outside the plume. Soil gas sampling in addition to groundwater sampling can be used to help identify areas where vapors may collect or be channeled, even if groundwater concentrations are low (e.g., home near Wagon Lane and Wagon Lane Court). Soil samples should be collected adjacent to soil gas samples to differentiate contamination from groundwater and contamination from household sources (e.g., spilling gasoline from a lawn mower). Additional details concerning how the vapor intrusion pathway at Evergreen Manor might be addressed are presented in Section 7.

state that all contaminated groundwater associated with the Evergreen Manor VOC plume discharges to the Rock River, or that alternately, an underflow condition exists. In the event that the VOC contaminated groundwater observed at the site is present at sufficient depths to be influenced by the more regional flow regimes, it is possible that contaminants could be migrating beneath the Rock River.

- Temporal data on water levels, recharge from precipitation, geochemical conditions, flow direction and other hydrogeological data are also limited. This insufficient data limits the ability to conduct a full evaluation of the sources of variability in VOC concentrations and distributions. These temporal data are needed to more effectively assess the fate of contaminants in the groundwater.

- Some of the highest levels of PCE and TCE concentrations in soil gas were found in an area with some of the lowest levels of groundwater contamination. It is possible that contaminants that have not been characterized or quantified may be present near the water table surface or in the vadose zone in these areas, and a vapor migration potential may exist there.

7.2 RECOMMENDATIONS

The following subsections present recommendations that will address the data gaps and uncertainties identified in Section 6.

7.2.1 Recommendations for Groundwater Issues

Based on the discussions in the previous sections, it is evident that monitored natural attenuation (MNA) may be a likely candidate for use as the remedial option for the Evergreen Manor site. In the event that MNA is determined suitable for implementation as a cleanup remedy, it is equally as important to have an appropriate monitoring network to verify and demonstrate that the cleanup goals established are being met in an appropriate time frame. To address the data gaps and uncertainties identified in Section 6, additional characterization activities would be needed prior to implementing any remedial alternative. These characterization activities should be conducted during the pre-design phase. The characterization activities would be designed to:

- Sample all private wells within the plume site boundary (as determined by the historical maximum extent of VOCs) and in nearby areas to confirm that these wells are not impacted. This would include sampling approximately nine locations along Metric Road, 19 locations along East Rockton Road, 12 locations along Route 251/2nd Street, 19 locations along Degroff, four locations along McCurry, and 10 locations along Stamford Lane and Waltham Road.

- Confirm groundwater flow. The current monitoring well network may not be appropriately located to determine accurate groundwater flow direction. Confirming the groundwater flow across the site can help identify areas where groundwater contaminants may remain. This can be done by installing approximately 11 piezometers at locations shown in Figure 7-1. Groundwater elevation data from the piezometers should be used to supplement groundwater elevation data from the existing groundwater monitoring well network.

- Evaluate whether existing monitoring wells are appropriately located to monitor the remaining groundwater contamination, and identify the extent and concentrations of the remaining groundwater contamination. This could be done through vertical profiling near existing well locations, with additional vertical profiling in nearby areas to confirm the extent of any remaining contamination. Groundwater flow directions and private well sampling can also be used to help target areas where groundwater contaminants may remain. Vertical profiling could be conducted in the vicinity of the following areas:

  - MW-103, MW-107, MW-108, MW-109 (10 locations)

  - Degroff Street, MW-101, and unsampled CPT-07, CPT-08 and CPT-13 (6 locations)

  - Between CPT-05 and CPT-10 and CPT-10 and CPT-06 (4 locations)

  - In the subdivisions to determine current concentrations in the center of the plume and to confirm plume boundaries (15 locations)

  - On the other side of the Rock River to confirm there is no underflow and contaminant transport to the other side of the Rock River (5 locations)

The actual number of vertical profiling locations could be more or less and would depend on the results of initial vertical profiling locations:

- Use the results of the groundwater elevation data, vertical profiling and residential well sampling to identify horizontal and vertical areas in which additional monitoring

wells are needed for any long-term monitoring programs. Approximately 10 additional shallow wells and 10 additional deep wells may be needed. The actual number of monitoring wells needed would depend on the results of the pre-design investigations.

7.2.2 Recommendations for Groundwater to Vapor Intrusion Pathway

As noted in Section 6, the extent of soil gas and shallow groundwater contamination should be characterized throughout the subdivisions. The soil gas and indoor air monitoring program should target a statistically significant number of homes. The initial sampling should target homes in areas that, historically, have had the highest levels of groundwater contamination (e.g., those along the centerline of the plume), homes in areas where relatively lower level of contamination has been observed, and homes that lie outside the plume. Soil gas sampling in addition to groundwater sampling should be used to help identify areas where vapors may collect or be channeled, even if groundwater concentrations are low (e.g., home near Wagon Lane and Wagon Lane Court). Soil samples should be collected adjacent to soil gas samples to differentiate contamination from groundwater and contamination from household sources (e.g., spilling gasoline from a lawn mower). The characterization activities, conducted during pre-design, should include:

- Soil gas and shallow groundwater sampling at approximately 50 locations within the subdivisions (20% of homes) to determine the nature and extent of any shallow groundwater and soil gas contamination and target approximately 25 homes for a long-term vapor monitoring program. The actual number of locations could be more or less and would depend on the results of initial soil gas and groundwater results. Approximately three soil gas samples would be collected at each sampling location - one just above the water table, one consistent with the bottom of the home's foundation (about 8 ft) and one in between. Approximately two groundwater samples should be collected at each location - one at the water table and one in the interval below.

- Soil sampling would be needed at locations where groundwater sample results do not correlate well with soil gas sample results to determine whether there are any homeowner-related spills.

- Septic systems, used by most, if not all of the Evergreen Manor subdivision residents, may be a point-source of certain contamination (e.g., use of chemicals to unclog a

drain). Based on the results of the soil gas and shallow groundwater characterization, it may be necessary to collect additional soil, soil gas and shallow groundwater samples in the vicinity of selected septic systems to determine whether the septic sytem is a source of contamination. However, it should also be noted that, prior to the municipal well-hookup, household water obtained from contaminated private well supplies was discharged to septic systems.

- Based on the results of the soil gas and shallow groundwater sampling, approximately 25 homes should be targeted for soil gas and indoor air monitoring. Monitoring should include 24-hour indoor air samples at two to three locations per home and 24-hour samples at four soil gas locations at foundation depth per home four times a year (spring, summer, fall and winter). One of the indoor air samples could be collected in or near an attached garage to evaluate whether any BTEX compounds are homeowner-related or site-related. Soil samples could also be collected for VOC analysis at each soil gas location to determine whether there were any homeowner-related spills during sampling period. Shallow groundwater samples should also be collected at about 10 locations during each sampling period to correlate groundwater concentrations with soil gas findings. The soil gas and indoor air monitoring should continue for two years until baseline indoor air and soil gas concentrations are established. The soil gas and indoor air monitoring should continue until it is confirmed that vapor intrusion via soil gas is not a threat.

APPENDIX H

Detailed Cost Estimate for Pump and Treat Alternative

Alternative 2
Groundwater Pump-and-Treat System
Evergreen Manor Site
Roscoe, Illinois

	ENGINEER'S ESTIMATES					COMMENTS
	Quantity	Unit	Unit Price	Cost	Subtotal	
DIRECT COSTS						
SITE CHARACTERIZATION AND INITIAL INVESTIGATION						
VERTICAL PROFILE SAMPLING						
ROTOSONIC SUBCONTRACTOR	1	lump sum	$398,094	$398,094		Cost includes subcontractor labor, mobilization, decon, water sampling, boring abandonment, and drilling. Profiling will be done at 40 locations to a depth of 135 feet. Based on 10 samples per location.
OVERSIGHT OF WORK						
Labor	1280	hour	$80	$102,400		Based on 2 people for 64 days (10 hours per day).
Per Diem	128	man days	$85	$10,880		Based on 2 people for 64 days.
Equipment	1	lump sum	$8,500	$8,500		Cost includes rental of equipment and expendable supplies.
Rental Vehicle	64	day	$80	$5,120		
ANALYTICAL						
VOC Analysis (water)	530	sample	$90	$47,700		Based on 400 investigative samples, 40 duplicates, 40 equipment blank, and 50 trip blanks
Shipping	50	shipment	$70	$3,500		
					$576,194	
PIEZOMETER INSTALLATION						
ROTOSONIC SUBCONTRACTOR	1	lump sum	$40,471	$40,471		Cost includes subcontractor labor, mobilization, decon, well materials, and drilling. 10 piezometers will be installed to 50';1 piezometer will be installed to 100' (50% of wells necessary of Alternative 3 was assumed).
OVERSIGHT OF WORK						
Labor	80	hour	$80	$6,400		Based on 2 people for 4 days (10 hours per day).
Per Diem	8	man days	$85	$680		Based on 2 people for 4 days.
Equipment	1	lump sum	$1,500	$1,500		Cost includes rental of various equipment, as well as some purchase items.
Rental Vehicle	4	day	$80	$320		
					$49,371	
MONITOR WELL INSTALLATION						
ROTOSONIC SUBCONTRACTOR	1	lump sum	$43,265	$43,265		Cost includes subcontractor labor, mobilization, decon, well materials, and drilling. Based on 3 wells to be installed to 50';3 wells to be installed to 100'.
OVERSIGHT OF WORK						
Labor	120	hour	$80	$9,600		Based on 2 people for 6 days (10 hours per day).
Per Diem	12	man days	$85	$1,020		Based on 2 people for 6 days.
Equipment	1	lump sum	$300	$300		Cost includes equipment rental and expendable supplies.
Rental Vehicle	6	day	$80	$480		
					$54,665	

Alternative 2
Groundwater Pump-and-Treat System
Evergreen Manor Site
Roscoe, Illinois

	ENGINEER'S ESTIMATES					COMMENTS
	Quantity	Unit	Unit Price	Cost	Subtotal	
DEVELOPMENT OF NEWLY INSTALLED WELLS						
Labor	40	hour	$80	$3,200		Based on 3 wells per day (10 hours per day); total of 6 wells
Per Diem	4	man days	$85	$340		Based on 2 people for 2 days
Equipment	1	lump sum	$600	$600		Include equipment rental and expendable supplies
Rental Vehicle	2	day	$80	$160		
					$4,300	
BASELINE RESIDENTIAL WELL SAMPLING						
Pre-Sampling Labor	160	hour	$40	$6,400		Obtaining access agreements to sample at a residence, based on 10 access agreements signed per day (10 hours per day) for total of 73 wells (10 wells part of long term monitoring program)
Labor	70	hour	$80	$5,600		Based on 10 wells per day (10 hours per day) for 2 people (10 hours per day) for 7 days
Per Diem	14	man days	$85	$1,190		
Rental Vehicle	7	days	$80	$560		
Analytical						
VOC analysis (water)	84	sample	$90	$7,560		Based on 63 investigative samples, 7 duplicates, 7 trip blanks, and 7 equipment blanks
Shipping	7	shipment	$70	$490		
					$21,800	
SOIL VAPOR SAMPLING						
GEOPROBE SUBCONTRACTOR	1	lump sum	$21,077	$21,077		Cost includes subcontractor labor, mobilization, decon, and materials. Based on 50 locations with 3 borings at each location (8', 20', and 30').
OVERSIGHT OF WORK						
Labor	300	hour	$80	$24,000		Based on 2 people for 15 days (10 hours per day)
Per Diem	30	man days	$85	$2,550		Based on 2 people for 15 days
Equipment	1	lump sum	$3,350	$3,350		Cost includes rental of various equipment, as well as some purchase items.
Rental Vehicle	15	day	$80	$1,200		
ANALYTICAL						
VOC Analysis (air)	195	sample	$600	$117,000		Based on 150 investigative samples, 15 trip blanks, 15 equipment blanks, 15 duplicate
Shipping	30	shipment	$70	$2,100		
					$171,277	

Alt. ..ive 2
Groundwater Pump-and-Treat System
Evergreen Manor Site
Roscoe, Illinois

	ENGINEER'S ESTIMATES					COMMENTS
	Quantity	Unit	Unit Price	Cost	Subtotal	
SHALLOW GROUNDWATER CHARACTERIZATION						
ROTOSONIC SUBCONTRACTOR	1	lump sum	$56,120	$56,120		Cost includes labor, mobilization, decon, well materials, and drilling. 50 locations will be investigated. Each boring will be completed to 45', with groundwater samples being collected from 35' to 40' and 40' to 45'.
OVERSIGHT OF WORK						
Labor	300	hour	$80	$24,000		Based on 2 people for 15 days (10 hours per day)
Per Diem	30	man days	$85	$2,550		Based on 2 people for 15 days.
Equipment	1	lump sum	$350	$350		Cost includes rental of various equipment, as well as some purchase items.
Rental Vehicle	15	day	$80	$1,200		
ANALYTICAL						
VOC analysis (water)	130	sample	$90	$11,700		Based on 100 investigative samples, 10 trip blanks, 10 equipment blanks, 10 duplicate
Shipping	15	shipment	$70	$1,050		
					$96,970	
ADDITIONAL SOIL SAMPLING						
GEOPROBE SUBCONTRACTOR	1	lump sum	$1,878	$1,878		Cost includes subcontractor labor, mobilization, decon, and materials. Based on 10 borings to be drilled to 10ft.
OVERSIGHT OF WORK						
Labor	24	hour	$80	$1,920		Based on 2 people for 1 day (12 hour per day).
Per Diem	2	man days	$85	$170		Based on 2 people for 1 day.
Equipment	1	lump sum	$200	$200		Cost includes rental of various equipment, as well as some purchase items.
Rental Vehicle	1	day	$80	$80		
ANALYTICAL						
VOC Analysis (soil)	65	sample	$157	$10,205		Based on 5 soil samples per boring, 5 trip blanks, 5 equipment blanks, 5 duplicates
Shipping	1	shipment	$70	$70		
					$14,523	
SEPTIC SYSTEM CHARACTERIZATION						
SUBCONTRACTOR WORK						
Geoprobe Subcontractor	1	lump sum	$7,960	$7,960		Cost includes subcontractor labor, mobilization, decon, and materials. For soil gas, 10 homes are assumed to be investigated with 3 samples per home to the depth of 15 feet. For soil sampling, 10 homes were assumed to be investigated with 3 samples per home to the depth of 10 feet.
Rotosonic Subcontractor	1	lump sum	$11,224	$11,224		Cost includes labor, mobilization, decon, well materials, and drilling. 10 homes were assumed to be investigated. It was assumed that one boring will be completed at each home to the depth of 45 feet. Groundwater samples to be collected from 35 to 40 and 40 to 45 feet bgs.
OVERSIGHT OF WORK						
Labor	100	hour	$80	$8,000		Based on 2 people for 5 days (10 hours per day).
Per Diem	10	man days	$85	$850		Based on 2 people for 5 days.
Equipment	1	lump sum	$1,250	$1,250		Cost includes rental of various equipment, as well as some purchase items.
Rental Vehicle	5	day	$80	$400		
ANALYTICAL						
VOC analysis (soil)	39	sample	$157	$6,123		Based on 30 investigative samples, 3 equipment blank, 3 trip blank, 3 duplicate samples
VOC analysis (water)	27	sample	$90	$2,430		Based on 20 investigative samples, 2 equipment blank, 3 trip blank, 2 duplicate samples
VOC analysis (air)	36	sample	$600	$21,600		Based on 30 investigative samples, 3 equipment blank, 3 trip blank
Shipping	14	shipment	$70	$980		Based on 14 packages
					$60,817	

Alternative 2
Groundwater Pump-and-Treat System
Evergreen Manor Site
Roscoe, Illinois

	ENGINEER'S ESTIMATES					COMMENTS
	Quantity	Unit	Unit Price	Cost	Subtotal	
PUMP AND TREAT						
MOBILIZATION/DEMOBILIZATION	1	Lump Sum	$20,000	$20,000		Mob/Demob of groundwater system equipment.
					$20,000	
SITE PREPARATION						
Site Preparation	1	Lump Sum	$40,000	$40,000		Includes office trailer, furnishings, telephone, generator, sanitary facilities, and clearing and grubbing
Land acquisition	1	Lump Sum	$75,000	$75,000		Include 3 1/4-acre parcels for treatment building.
Easements	1	Lump Sum	$35,000	$35,000		
					$150,000	
INSTALLATION OF PUMP AND TREAT SYSTEM						
Predesign Pump Test	1	Lump Sum	$25,000	$25,000		
Extraction Wells	23	Wells	$6,500	$149,500		4-inch diameter, stainless steel, 100-ft deep each @$40/ft.
Groundwater Pumps	23	Lump Sum	$2,500	$57,500		500 gpm well pumps
8-inch Transfer Piping	14,300	Linear Feet	$26	$371,800		8-inch diameter, Installed. Includes fittings. Influent and effluent piping.
10-inch Transfer Piping	5,200	Linear Feet	$35	$182,000		10-inch diameter, Installed. Includes fittings. Influent and effluent piping.
12-inch Transfer Piping	4,000	Linear Feet	$44	$176,000		12-inch diameter, Installed. Includes fittings. Influent and effluent piping.
16-inch Transfer Piping	3,400	Linear Feet	$54	$183,600		16-inch diameter, Installed. Includes fittings. Influent and effluent piping.
18-inch Transfer Piping	4,200	Linear Feet	$70	$294,000		18-inch diameter, Installed. Includes fittings. Influent and effluent piping.
Treatment Building	25,200	Square Feet	$120	$3,024,000		2 120-ft by 70-ft buildings on slab foundation.
Treatment Building Foundation	25,200	Square Feet	$20	$504,000		8-inch thick, reinforced concrete.
Electrical	1	Lump Sum	$100,000	$100,000		Includes equipment and installation
Tray Stripper	23	Lump Sum	$65,000	$1,495,000		500 gpm design flow, stainless steel. Skid-mounted, 4-tray. Includes control package, feed pump, discharge pump.
Instrumentation	23	Lump Sum	$16,700	$384,100		
River/Creek Outfalls	3	Lump Sum	$15,000	$45,000		
Bag filter	23	Lump Sum	$1,000	$23,000		
Startup Sampling						
Air samples at Stack	6	Samples	$700	$4,200		
Influent/Effluent Water Samples	80	Samples	$150	$12,000		Analysis of VOCs. Includes shipping.
					$7,030,700	
DIRECT COST SUBTOTAL					$8,251,000	
INDIRECT COSTS						
ENGINEERING/DESIGN/INVESTIGATION						
Engineering and Design	1	-	$412,550	$412,550		5% capital costs
					$412,600	
CONTRACTOR PROCUREMENT	1	Lump Sum	$10,000	$10,000		
					$10,000	
BONDS AND INSURANCE	1	Lump Sum	$660,080	$660,080		8% capital costs
REPORT WRITING	1	Lump Sum	$66,000	$66,000		
					$66,000	
ADDITIONAL CHARACTERIZATION						
HOME OFFICE LABOR						
Project Planning	1	Lump Sum		$22,000		
					$22,000	
					$660,100	
CONSTRUCTION MANAGEMENT						
Project Manager	512	HR	$100	$51,200		8 hours/week for 64 weeks.
Resident Engineer	3,200	HR	$80	$256,000		One engineer for 64 weeks @ 50 hr/wk.
Per Diem (One Engineer)	320	DAY	$85	$27,200		
Car Rental	320	DAY	$80	$25,600		
H&S and Sampling Equipment	320	DAY	$1,000	$320,000		
Admin/Office Support	-	-	-	$25,600		10% of construction management labor.
Post-Construction Documentation and Certification	1	Lump Sum	$20,000	$20,000		
Site Security	64	WK	$2,000	$128,000		
					$853,600	
INDIRECT COST SUBTOTAL					$2,024,000	

Alt. ..tive 2
Groundwater Pump-and-Treat System
Evergreen Manor Site
Roscoe, Illinois

	ENGINEER'S ESTIMATES					COMMENTS
	Quantity	Unit	Unit Price	Cost	Subtotal	
ANNUAL OPERATIONS AND MAINTENANCE (O&M) COSTS						
MONITORING WELL SAMPLING						
QUARTERLY MONITORING FOR YEARS 1-5						
Labor	480	hour	$80	$38,400		Based on 3 wells per day (10 hours per day) per sampling event. 16 wells are assumed to be sampled.
Per Diem	48	man days	$85	$4,080		
Equipment	4	lump sum	$1,500	$6,000		Includes equipment rental and expendable supplies.
Rental Vehicle	24	day	$80	$1,920		
ANALYTICAL						
VOC Analysis (water)	104	sample	$90	$9,360		Based on 16 investigative samples, 2 duplicates, 6 trip blanks, and 2 equipment blanks per sampling event.
Shipping	24	shipment	$70	$1,680		
Reporting	4	each	$11,000	$44,000		
					$105,400	
ANNUAL O&M COST SUBTOTAL FOR YEARS 1-5					$105,400	
SUB-TOTAL of ANNUAL O&M COSTS WITH 25% CONTINGENCY FOR YEARS 1-5					$132,000	
SEMIANNUAL MONITORING FOR YEARS 6-7						
Labor	240	hour	$80	$19,200		Based on 3 wells per day (10 hours per day) per sampling event. 16 wells are assumed to be sampled.
Per Diem	24	man days	$85	$2,040		
Equipment	2	lump sum	$1,500	$3,000		Includes equipment rental and expendable supplies.
Rental Vehicle	12	day	$80	$960		
ANALYTICAL						
VOC Analysis (water)	52	sample	$90	$4,680		Based on 16 investigative samples, 2 duplicates, 6 trip blanks, and 2 equipment blanks per sampling event.
Shipping	12	shipment	$70	$840		
Reporting	2	each	$11,000	$22,000		
					$52,700	
ANNUAL O&M COST SUBTOTAL FOR YEARS 6-7					$52,700	
SUB-TOTAL of ANNUAL O&M COSTS WITH 25% CONTINGENCY FOR YEAR 6-7					$66,000	
ANNUAL MONITORING FOR YEARS 8						
Labor	120	hour	$80	$9,600		Based on 3 wells per day (10 hours per day) per sampling event. 16 wells are assumed to be sampled.
Per Diem	12	man days	$85	$1,020		
Equipment	1	lump sum	$1,500	$1,500		Includes equipment rental and expendable supplies.
Rental Vehicle	6	day	$80	$480		
ANALYTICAL						
VOC Analysis (water)	26	sample	$90	$2,340		Based on 16 investigative samples, 2 duplicates, 6 trip blanks, and 2 equipment blanks per sampling event.
Shipping	6	shipment	$70	$420		
Reporting	1	each	$11,000	$11,000		
					$26,400	
ANNUAL O&M COST SUBTOTAL FOR YEAR 8					$26,000	
SUB-TOTAL of ANNUAL O&M COSTS WITH 25% CONTINGENCY FOR YEAR 8					$33,000	
PRESENT WORTH of O&M COSTS WITH CONTINGENCY					$646,000	Assumes an interest factor of 7%

Alternative 2
Groundwater Pump-and-Treat System
Evergreen Manor Site
Roscoe, Illinois

	ENGINEER'S ESTIMATES					COMMENTS
	Quantity	Unit	Unit Price	Cost	Subtotal	
RESIDENTIAL WELL SAMPLING						
QUARTERLY MONITORING FOR YEARS 1-5						
Labor	80	hour	$80	$6,400		Based on 10 wells per day (10 hours per day), based on 2 people sampling team per sampling event
Per Diem	8	man days	$85	$680		Based on 2 people for one day per sampling event
Rental Vehicle	4	day	$80	$320		
ANALYTICAL						
VOC Analysis (water)	52	sample	$90	$4,680		Based on 10 investigative samples, 1 duplicate,1 trip blank, and 1 equipment blank per sampling event
Shipping	4	shipment	$70	$280		
Reporting	4	each	$11,000	$44,000		
					$56,400	
ANNUAL O&M COST SUBTOTAL FOR YEARS 1-5					$56,400	
SUB-TOTAL of ANNUAL O&M COSTS WITH 25% CONTINGENCY FOR YEARS 1-5					$71,000	
SEMIANNUAL MONITORING FOR YEARS 6-7						
Labor	40	hour	$80	$3,200		Based on 10 wells per day (10 hours per day), based on 2 people sampling team per sampling event
Per Diem	4	man days	$85	$340		Based on 2 people for one day per sampling event
Rental Vehicle	2	day	$80	$160		
ANALYTICAL						
VOC Analysis (water)	26	sample	$90	$2,340		Based on 10 investigative samples, 1 duplicate,1 trip blank, and 1 equipment blank per sampling event
Shipping	2	shipment	$70	$140		
Reporting	2	each	$11,000	$22,000		
					$28,200	
ANNUAL O&M COST SUBTOTAL FOR YEARS 6-7					$28,200	
SUB-TOTAL of ANNUAL O&M COSTS WITH 25% CONTINGENCY FOR YEAR 6-7					$35,000	
ANNUAL MONITORING FOR YEAR 8						
Labor	20	hour	$80	$1,600		Based on 10 wells per day (10 hours per day), based on 2 people sampling team per sampling event
Per Diem	2	man days	$85	$170		Based on 2 people for one day per sampling event
Rental Vehicle	1	day	$80	$80		
ANALYTICAL						
VOC Analysis (water)	13	sample	$90	$1,170		Based on 10 investigative samples, 1 duplicate,1 trip blank, and 1 equipment blank per sampling event
Shipping	1	shipment	$70	$70		
Reporting	1	each	$11,000	$11,000		
					$14,100	
ANNUAL O&M COST SUBTOTAL FOR YEAR 8					$14,000	
SUB-TOTAL of ANNUAL O&M COSTS WITH 25% CONTINGENCY FOR YEAR 8					$18,000	
PRESENT WORTH of O&M COSTS WITH CONTINGENCY					$347,000	Assumes an interest factor of 7%

Alternative 2
Groundwater Pump-and-Treat System
Evergreen Manor Site
Roscoe, Illinois

	ENGINEER'S ESTIMATES					COMMENTS
	Quantity	Unit	Unit Price	Cost	Subtotal	
SHALLOW GROUNDWATER SAMPLING						
QUARTERLY MONITORING FOR YEARS 1-2						
Rotosonic Subcontractor	4	lump sum	$22,448	$89,792		Cost includes labor, mobilization, decon, well materials, and drilling. 10 locations were assumed to be investigated. Each boring is assumed completed to 45', with groundwater samples being collected from 35' to 45' and 40' to 45'.
Labor	320	hour	$80	$25,600		Based on 2 people for 4 days (10 hours per day) at 3 borings per day per sampling event.
Per Diem	32	man days	$85	$2,720		Based on 2 people for 4 days per sampling event.
Equipment	4	lump sum	$350	$1,400		Cost includes equipment rental and expendable supplies.
Rental Vehicle	16	day	$80	$1,280		
ANALYTICAL						
VOC Analysis (water)	104	sample	$90	$9,360		Based on 20 investigative samples, 2 trip blanks, 2 equipment blanks and 2 duplicate samples per sampling event.
Shipping	16	shipment	$70	$1,120		
Reporting	4	each	$11,000	$44,000		
					$175,300	
ANNUAL O&M COST SUBTOTAL FOR YEARS 1-2					$175,300	
SUB-TOTAL of ANNUAL O&M COSTS WITH 25% CONTINGENCY FOR YEARS 1-2					$219,000	
QUARTERLY MONITORING FOR YEARS 3-7						
Rotosonic Subcontractor	4	lump sum	$8,979	$35,917		Cost includes labor, mobilization, decon, well materials, and drilling. 4 (40%) locations were assumed to be investigated. Each boring is assumed completed to 45', with groundwater samples being collected from 35-40' and 40-45'.
Labor	96	hour	$80	$7,680		Based on 2 people for 1 day at 12 hours per day for each sampling event.
Per Diem	8	man days	$85	$680		Based on 2 people for 1 day per each sampling event.
Equipment	4	lump sum	$100	$400		Cost includes rental of various equipment, as well as some purchase items.
Rental Vehicle	4	day	$80	$320		
ANALYTICAL						
VOC Analysis (water)	44	sample	$90	$3,960		Assume 8 investigative samples, 1 trip blanks, 1 equipment blanks, and 1 duplicate sample per sampling event.
Shipping	4	shipment	$70	$280		
Reporting	4	each	$11,000	$44,000		
					$93,200	
ANNUAL O&M COST SUBTOTAL FOR YEARS 3-7					$93,000	
SUB-TOTAL of ANNUAL O&M COSTS WITH 25% CONTINGENCY FOR YEARS 3-7					$116,000	
PRESENT WORTH of O&M COSTS WITH CONTINGENCY					$811,000	Assumes an interest factor of 7%

Alternative 2
Groundwater Pump-and-Treat System
Evergreen Manor Site
Roscoe, Illinois

	ENGINEER'S ESTIMATES					COMMENTS
	Quantity	Unit	Unit Price	Cost	Subtotal	
LONG-TERM AIR MONITORING PROGRAM						
QUARTERLY MONITORING FOR YEARS 1-2						
GEOPROBE SUBCONTRACTOR	4	lump sum	$12,646	$50,585		Cost includes subcontractor labor, mobilization, decon, and materials. Based on 25 homes with 4 borings (or soil gas samples) at each home per sampling event.
OVERSIGHT OF WORK						
Labor	800	hour	$80	$64,000		Based on 2 people for 10 days (10 hours per day) per sampling event.
Per Diem	80	man days	$85	$6,800		Based on 2 people for 10 days per sampling event.
Equipment	4	lump sum	$350	$4,400		Cost includes rental of various equipment, as well as some purchase items.
Rental Vehicle	40	day	$80	$3,200		Based on 2 vehicles per sampling event for air sampling canisters.
ANALYTICAL						
VOC Analysis (air)	916	sample	$600	$549,600		Based on 175 investigative samples, 18 trip blanks, 18 equipment blanks, 18 duplicates
Shipping	228	shipment	$70	$15,960		Based on 4 sample containers per shipment
Reporting	4	each	$11,000	$44,000		
					$738,500	
ANNUAL O&M COST SUBTOTAL FOR YEARS 1-2					$738,500	
SUB-TOTAL of ANNUAL O&M COSTS WITH 25% CONTINGENCY FOR YEARS 1-2					$923,000	
QUARTERLY MONITORING FOR YEARS 3-7						
GEOPROBE SUBCONTRACTOR	4	lump sum	$7,377	$29,508		Cost includes subcontractor labor, mobilization, decon, and materials. Based on 10 homes with 4 borings (or soil gas samples) at each home
OVERSIGHT OF WORK						
Labor	320	hour	$80	$25,600		Based on 2 people for 4 days (10 hours per day)
Per Diem	32	man days	$85	$2,720		Based on 2 people for 4 days.
Equipment	4	lump sum	$540	$5,160		Cost includes rental of various equipment, as well as some purchase items.
Rental Vehicle	16	day	$80	$1,280		
ANALYTICAL						
VOC Analysis (air)	376	sample	$600	$225,600		Based on 70 investigative samples, 4 trip blanks, 10 equipment blanks, 10 duplicates per sampling event.
Shipping	96	shipment	$70	$6,720		Based on 4 sample containers per shipment
Reporting	4	each	$11,000	$44,000		
					$340,600	
ANNUAL O&M COST SUBTOTAL FOR YEARS 3-7					$341,000	
SUB-TOTAL of ANNUAL O&M COSTS WITH 25% CONTINGENCY FOR YEARS 3-7					$426,000	
PRESENT WORTH of O&M COSTS WITH CONTINGENCY					$3,194,000	Assumes an interest factor of 7%

Alternative 2
Groundwater Pump-and-Treat System
Evergreen Manor Site
Roscoe, Illinois

	ENGINEER'S ESTIMATES					COMMENTS
	Quantity	Unit	Unit Price	Cost	Subtotal	
SOIL SAMPLING						
QUARTERLY MONITORING FOR YEARS 1-2						
Labor	800	hour	$80	$64,000		Based on 2 people for 10 days (10 hour day) at 10 locations per day.
Per Diem	80	man days	$85	$6,800		Based on 2 people for 10 days.
Equipment	4	lump sum	$1,000	$1,000		Cost includes rental of various equipment, as well as some purchase items.
Rental Vehicle	40	day	$80	$3,200		
ANALYTICAL						
VOC Analysis (soil)	520	sample	$157	$81,640		Based on 100 investigative samples, 10 duplicates, 10 trip blanks, and 10 equipment blanks per sampling event.
Shipping	40	shipment	$70	$2,800		
Reporting	4	each	$11,000	$44,000		
					$203,400	
ANNUAL O&M COST SUBTOTAL FOR YEARS 1-2					$203,400	
SUB-TOTAL of ANNUAL O&M COSTS WITH 25% CONTINGENCY FOR YEARS 1-2					$254,000	
QUARTERLY MONITORING FOR YEARS 3-7						
Labor	320	hour	$80	$25,600		Based on 2 people for 4 days (10 hour day) at 10 locations per day.
Per Diem	32	man days	$85	$2,720		Based on 2 people for 4 days.
Equipment	4	lump sum	$400	$1,600		Cost includes rental of various equipment, as well as some purchase items.
Rental Vehicle	16	day	$80	$1,280		
ANALYTICAL						
VOC Analysis (soil)	208	sample	$157	$32,656		Based on 40 investigative samples, 4 duplicates, 4 trip blanks, and 4 equipment blanks per sampling event.
Shipping	16	shipment	$70	$1,120		
Reporting	4	each	$11,000	$44,000		
					$109,000	
ANNUAL O&M COST SUBTOTAL FOR YEARS 3-7					$109,000	
SUB-TOTAL of ANNUAL O&M COSTS WITH 25% CONTINGENCY FOR YEARS 3-7					$136,000	
PRESENT WORTH of O&M COSTS WITH CONTINGENCY					$946,000	Assumes an interest factor of 7%

Alternative 2
Groundwater Pump-and-Treat System
Evergreen Manor Site
Roscoe, Illinois

	ENGINEER'S ESTIMATES					COMMENTS
	Quantity	Unit	Unit Price	Cost	Subtotal	
ANNUAL SYSTEM OPERATION AND MAINTENANCE						
Annual Pump Maintenance	1	Event	$25,000	$25,000		
Annual Cleaning of Strippers	800	Hour	$80	$64,000		Assume 2 employees, 150 hours per month per employee, 12 months/yr
Annual Electricity Requirements	6,912,000	kW-hr	$0.1	$691,200		Assume 800 kw/hr for 23 blowers and 23 pumps.
					$780,200	
ANNUAL O&M COST SUBTOTAL FOR YEARS 1-8					$780,000	
SUB-TOTAL of ANNUAL O&M COSTS WITH 25% CONTINGENCY FOR YEARS 1-8					$975,000	
PRESENT WORTH of O&M COSTS WITH CONTINGENCY					$5,822,000	Assumes an interest factor of 7%
ANNUAL EFFLUENT MONITORING						
Labor	288	HR	$80	$23,040		Assumes 1 Engineer@20 hours/month + 4 hours/month for travel.
Per Diem	24	days	$85	$2,040		
Mob / Demob	15	HR	$80	$1,200		
Analytical						
Volatile Organic Compounds	40	Sample	$150	$6,000		2 effluent samples + blank per month. Includes shipping costs
Total Suspended Solids	12	Sample	$30	$360		Cost includes shipping. One sample per month.
Biochemical Oxygen Demand	12	Lump Sum	$100	$1,200		Cost includes shipping. One sample per month.
Reporting	4	Report	$6,000	$24,000		Quarterly report
H&S and Sampling Equipment	24	Days	$200	$4,800		1 day per month.
Rental Vehicle	24	Days	$60	$1,440		1 day per month.
					$64,080	
ANNUAL O&M COST SUBTOTAL FOR YEARS 8					$64,000	
SUB-TOTAL of ANNUAL O&M COSTS WITH 25% CONTINGENCY FOR YEARS 8					$80,000	
PRESENT WORTH of O&M COSTS WITH CONTINGENCY					$478,000	Assumes an interest factor of 7%
SUB-TOTAL of DIRECT AND INDIRECT COSTS					$10,275,000	
SUB-TOTAL of DIRECT AND INDIRECT COSTS WITH 25% CONTINGENCY					$12,844,000	
PRESENT WORTH of O&M COSTS WITH CONTINGENCY					$12,244,000	Assumes an interest factor of 7 %.
TOTAL COST (DIRECT COSTS + INDIRECT COSTS + PRESENT WORTH COSTS) WITH CONTINGENCY					$25,088,000	

APPENDIX I

Detailed Cost Estimate for Monitored Natural Attenuation Alternative

Alternative 3
Natural Attenuation
Evergreen Manor Site
Roscoe, Illinois

	ENGINEER'S ESTIMATES					COMMENTS
	Quantity	Unit	Unit Price	Cost	Subtotal	
DIRECT COSTS						
VERTICAL PROFILE SAMPLING						
ROTOSONIC SUBCONTRACTOR	1	lump sum	$398,094	$398,094		Cost includes subcontractor labor, mobilization, decon, water sampling, boring abandonment, and drilling. Profiling will be done at 40 locations to a depth of 135 feet. Based on 10 samples per location.
OVERSIGHT OF WORK						
Labor	1280	hour	$80	$102,400		Based on 2 people for 64 days (10 hours per day).
Per Diem	128	man days	$85	$10,880		Based on 2 people for 64 days.
Equipment	1	lump sum	$8,500	$8,500		Cost includes rental of equipment and expendable supplies.
Rental Vehicle	64	day	$80	$5,120		
ANALYTICAL						
VOC Analysis (water)	530	sample	$90	$47,700		Based on 400 investigative samples, 40 duplicates, 40 equipment blank, and 50 trip blanks.
Shipping	50	shipment	$70	$3,500		
					$576,194	
PIEZOMETER INSTALLATION						
ROTOSONIC SUBCONTRACTOR	1	lump sum	$40,471	$40,471		Cost includes subcontractor labor, mobilization, decon, well materials, and drilling. 10 piezometers will be installed to 50';1 piezometer will be installed to 100'
OVERSIGHT OF WORK						
Labor	80	hour	$80	$3,200		Based on 2 people for 4 days (10 hours per day).
Per Diem	8	man days	$85	$680		Based on 2 people for 4 days.
Equipment	1	lump sum	$1,500	$1,500		Cost includes rental of various equipment, as well as some purchase items.
Rental Vehicle	4	day	$80	$320		
					$46,171	
MONITOR WELL INSTALLATION						
ROTOSONIC SUBCONTRACTOR	1	lump sum	$108,163	$108,163		Cost includes subcontractor labor, mobilization, decon, well materials, and drilling. Based on 10 wells to be installed to 50';10 wells to be installed to 100'
OVERSIGHT OF WORK						
Labor	360	hour	$80	$28,800		Based on 2 people for 18 days (10 hours per day).
Per Diem	36	man days	$85	$3,060		Based on 2 people for 18 days.
Equipment	1	lump sum	$500	$500		Cost includes equipment rental and expendable supplies.
Rental Vehicle	18	day	$80	$1,440		
					$141,963	

Alternative 3
Natural Attenuation
Evergreen Manor Site
Roscoe, Illinois

	ENGINEER'S ESTIMATES					COMMENTS
	Quantity	Unit	Unit Price	Cost	Subtotal	
DEVELOPMENT OF NEWLY INSTALLED WELLS						
Labor	140	hour	$80	$11,200		Based on 3 wells per day (10 hours per day); total of 20 wells
Per Diem	14	man days	$85	$1,190		Based on 2 people for 7 days
Equipment	1	lump sum	$1,500	$1,500		Include equipment rental and expendable supplies
Rental Vehicle	7	day	$80	$560		
					$14,450	
BASELINE RESIDENTIAL WELL SAMPLING						
Pre-Sampling Labor	80	hour	$40	$3,200		Obtaining access agreements to sample at a residence, based on 10 access agreements signed per day (10 hours per day) for total of 73 wells (10 wells part of long term monitoring program)
Labor	140	hour	$80	$5,600		Based on 10 wells per day (10 hours per day) for 2 people (10 hours per day) for 7 days
Per Diem	14	man days	$85	$1,190		
Rental Vehicle	7	day	$80	$560		
Analytical						
VOC analysis (water)	84	sample	$90	$7,560		Based on 63 investigative samples, 7 duplicates, 7 trip blanks, and 7 equipment blanks
Shipping	7	shipment	$70	$490		
					$18,600	
SOIL VAPOR SAMPLING						
GEOPROBE SUBCONTRACTOR	1	lump sum	$21,077	$21,077		Cost includes subcontractor labor, mobilization, decon, and materials. Based on 50 locations with 3 borings at each location (8', 20', and 30').
OVERSIGHT OF WORK						
Labor	300	hour	$80	$24,000		Based on 2 people for 15 days (10 hours per day)
Per Diem	30	man days	$85	$2,550		Based on 2 people for 15 days
Equipment	1	lump sum	$3,350	$3,350		Cost includes rental of various equipment, as well as some purchase items.
Rental Vehicle	15	day	$80	$1,200		
ANALYTICAL						
VOC Analysis (air)	195	sample	$600	$117,000		Based on 150 investigative samples, 15 trip blanks, 15 equipment blanks, 15 duplicate
Shipping	30	shipment	$70	$2,100		
					$171,277	

A. ative 3
Natural Attenuation
Evergreen Manor Site
Roscoe, Illinois

	ENGINEER'S ESTIMATES					COMMENTS
	Quantity	Unit	Unit Price	Cost	Subtotal	
SHALLOW GROUNDWATER CHARACTERIZATION						
ROTOSONIC SUBCONTRACTOR	1	lump sum	$56,120	$56,120		Cost includes labor, mobilization, decon, well materials, and drilling. 50 locations will be investigated. Each boring will be completed to 45', with groundwater samples being collected from 35' to 40' and 40' to 45'.
OVERSIGHT OF WORK						
Labor	300	hour	$80	$12,000		Based on 2 people for 15 days (10 hours per day)
Per Diem	30	man days	$85	$2,550		Based on 2 people for 15 days.
Equipment	1	lump sum	$350	$350		Cost includes rental of various equipment, as well as some purchase items.
Rental Vehicle	15	day	$80	$1,200		
ANALYTICAL						
VOC analysis (water)	130	sample	$90	$11,700		Based on 100 investigative samples, 10 trip blanks, 10 equipment blanks, 10 duplicate
Shipping	15	shipment	$70	$1,050		
					$84,970	
ADDITIONAL SOIL SAMPLING						
GEOPROBE SUBCONTRACTOR	1	lump sum	$1,878	$1,878		Cost includes subcontractor labor, mobilization, decon, and materials. Based on 10 borings to be drilled to 10ft.
OVERSIGHT OF WORK						
Labor	24	hour	$80	$1,920		Based on 2 people for 1 day (12 hour per day)
Per Diem	2	man days	$85	$170		Based on 2 people for 1 day.
Equipment	1	lump sum	$200	$200		Cost includes rental of various equipment, as well as some purchase items.
Rental Vehicle	1	day	$80	$80		
ANALYTICAL						
VOC Analysis (soil)	65	sample	$157	$10,205		Based on 5 soil samples per boring, 5 trip blanks, 5 equipment blanks, 5 duplicates
Shipping	1	shipment	$70	$70		
					$14,523	
SEPTIC SYSTEM CHARACTERIZATION						
SUBCONTRACTOR WORK						
Geoprobe Subcontractor	1	lump sum	$7,960	$7,960		Cost includes subcontractor labor, mobilization, decon, and materials. For soil gas, 10 homes are assumed to be investigated with 3 samples per home to the depth of 15 feet. For soil sampling, 10 homes were assumed to be investigated with 3 samples per home to the depth of 10 feet.
Rotosonic Subcontractor	1	lump sum	$11,224	$11,224		Cost includes labor, mobilization, decon, well materials, and drilling. 10 homes were assumed to be investigated. It was assumed that one boring will be completed at each home to the depth of 45 feet. Groundwater samples to be collected from 35-40 and 40-45 feet bgs.
OVERSIGHT OF WORK						
Labor	100	hour	$80	$8,000		Based on 2 people for 5 days (10 hours per day)
Per Diem	10	man days	$85	$850		Based on 2 people for 5 days.
Equipment	1	lump sum	$1,250	$1,250		Cost includes rental of various equipment, as well as some purchase items.
Rental Vehicle	5	day	$80	$400		
ANALYTICAL						
VOC analysis (soil)	39	sample	$157	$6,123		Based on 30 investigative samples, 3 equipment blank, 3 trip blank, 3 duplicate samples
VOC analysis (water)	27	sample	$90	$2,430		Based on 20 investigative samples, 2 equipment blank, 3 trip blank, 2 duplicate samples
VOC analysis (air)	36	sample	$600	$21,600		Based on 30 investigative samples, 3 equipment blank, 3 trip blank
Shipping	14	shipment	$70	$980		Based on 14 packages
					$60,817	
DIRECT COST SUBTOTAL					$1,129,000	

Alternative 3
Natural Attenuation
Evergreen Manor Site
Roscoe, Illinois

	ENGINEER'S ESTIMATES					COMMENTS
	Quantity	Unit	Unit Price	Cost	Subtotal	
INDIRECT COSTS						
ENGINEERING/DESIGN/INVESTIGATION						
Engineering and Design	1	-	$112,900	$112,900		10% capital costs
					$112,900	
CONTRACTOR PROCUREMENTS	1	Lump Sum	$25,000	$25,000		
					$25,000	
BONDS AND INSURANCE	1	Lump Sum	$90,320	$90,320		8% capital costs
					$90,300	
REPORT WRITING	1	Lump Sum	$66,000	$66,000		
					$66,000	
ADDITIONAL CHARACTERIZATION						
HOME OFFICE LABOR						
Project Planning	1	Lump Sum		$22,000		
					$22,000	
INDIRECT COST SUBTOTAL					$316,000	

A. ...ative 3
Natural Attenuation
Evergreen Manor Site
Roscoe, Illinois

	ENGINEER'S ESTIMATES					COMMENTS
	Quantity	Unit	Unit Price	Cost	Subtotal	
ANNUAL OPERATIONS AND MAINTENANCE (O&M) COSTS						
MONITORING WELL SAMPLING						
QUARTERLY MONITORING FOR YEARS 1-5						
Labor	800	hour	$80	$64,000		Based on 3 wells per day (10 hours per day) per sampling event. 30 wells are assumed to be sampled.
Per Diem	80	man days	$85	$6,800		
Equipment	4	lump sum	$2,500	$10,000		Includes equipment rental and expendable supplies.
Rental Vehicle	40	day	$80	$3,200		
ANALYTICAL						
VOC Analysis (water)	184	sample	$90	$16,560		Based on 30 investigative samples, 3 duplicate, 10 trip blanks, and 3 equipment blanks per sampling event.
Water Quality Parameters	33	sample	$500	$16,500		Based on 30 investigative samples and 3 duplicate samples. Only one sampling event is assumed.
Shipping	40	shipment	$70	$2,800		
Reporting	4	each	$11,000	$44,000		
					$163,900	
ANNUAL O&M COST SUBTOTAL FOR YEARS 1-5					$163,900	
SUB-TOTAL of ANNUAL O&M COSTS WITH 25% CONTINGENCY FOR YEARS 1-5					$205,000	
SEMIANNUAL MONITORING FOR YEARS 6-10						
Labor	400	hour	$80	$32,000		Based on 3 wells per day (10 hours per day) per sampling event.
Per Diem	40	man days	$85	$3,400		
Equipment	2	lump sum	$2,500	$5,000		Includes equipment rental and expendable supplies.
Rental Vehicle	20	day	$80	$1,600		
ANALYTICAL						
VOC Analysis (water)	92	sample	$90	$8,280		Based on 30 investigative samples, 3 duplicate, 10 trip blanks, and 3 equipment blanks per sampling event.
Shipping	20	shipment	$70	$1,400		
Reporting	2	each	$11,000	$22,000		
					$73,700	
ANNUAL O&M COST SUBTOTAL FOR YEARS 6-10					$73,700	
SUB-TOTAL of ANNUAL O&M COSTS WITH 25% CONTINGENCY FOR YEAR 6-10					$92,000	
ANNUAL MONITORING FOR YEARS 11-15						
Labor	200	hour	$80	$16,000		Based on 3 wells per day (10 hours per day) per sampling event.
Per Diem	20	man days	$85	$1,700		
Equipment	1	lump sum	$2,500	$2,500		Includes equipment rental and expendable supplies.
Rental Vehicle	10	day	$80	$800		
ANALYTICAL						
VOC Analysis (water)	46	sample	$90	$4,140		Based on 30 investigative samples, 3 duplicate, 10 trip blanks, and 3 equipment blanks per sampling event.
Shipping	10	shipment	$70	$700		
Reporting	1	each	$11,000	$11,000		
					$36,800	
ANNUAL O&M COST SUBTOTAL FOR YEARS 11-15					$37,000	
SUB-TOTAL of ANNUAL O&M COSTS WITH 25% CONTINGENCY FOR YEARS 11-15					$46,000	
PRESENT WORTH of O&M COSTS WITH CONTINGENCY					$1,205,000	Assumes an interest factor of 7%

Alternative 3
Natural Attenuation
Evergreen Manor Site
Roscoe, Illinois

	ENGINEER'S ESTIMATES					COMMENTS
	Quantity	Unit	Unit Price	Cost	Subtotal	
RESIDENTIAL WELL SAMPLING						
QUARTERLY MONITORING FOR YEARS 1-5						
Labor	80	hour	$80	$6,400		Based on 10 wells per day (10 hours per day), based on 2 people sampling team per sampling event
Per Diem	8	man days	$85	$680		Based on 2 people for one day per sampling event
Rental Vehicle	4	day	$80	$320		
ANALYTICAL						
VOC Analysis (water)	52	sample	$90	$4,680		Based on 10 investigative samples, 1 duplicate,1 trip blank, and 1 equipment blank per sampling event
Shipping	4	shipment	$70	$280		
Reporting	4	each	$11,000	$44,000		
					$56,400	
ANNUAL O&M COST SUBTOTAL FOR YEARS 1-5					$56,400	
SUB-TOTAL of ANNUAL O&M COSTS WITH 25% CONTINGENCY FOR YEARS 1-5					$71,000	
SEMIANNUAL MONITORING FOR YEARS 6-10						
Labor	40	hour	$80	$3,200		Based on 10 wells per day (10 hours per day), based on 2 people sampling team per sampling event
Per Diem	4	man days	$85	$340		Based on 2 people for one day per sampling event
Rental Vehicle	2	day	$80	$160		
ANALYTICAL						
VOC Analysis (water)	26	sample	$90	$2,340		Based on 10 investigative samples, 1 duplicate,1 trip blank, and 1 equipment blank per sampling event
Shipping	2	shipment	$70	$140		
Reporting	2	each	$11,000	$22,000		
					$28,200	
ANNUAL O&M COST SUBTOTAL FOR YEARS 6-10					$28,200	
SUB-TOTAL of ANNUAL O&M COSTS WITH 25% CONTINGENCY FOR YEAR 6-10					$35,000	
ANNUAL MONITORING FOR YEARS 11-15						
Labor	20	hour	$80	$1,600		Based on 10 wells per day (10 hours per day), based on 2 people sampling team per sampling event
Per Diem	2	man days	$85	$170		Based on 2 people for one day per sampling event
Rental Vehicle	1	day	$80	$80		
ANALYTICAL						
VOC Analysis (water)	13	sample	$90	$1,170		Based on 10 investigative samples, 1 duplicate,1 trip blank, and 1 equipment blank per sampling event
Shipping	1	shipment	$70	$70		
Reporting	1	each	$11,000	$11,000		
					$14,100	
ANNUAL O&M COST SUBTOTAL FOR YEARS 11-15					$14,000	
SUB-TOTAL of ANNUAL O&M COSTS WITH 25% CONTINGENCY FOR YEARS 11-15					$18,000	
PRESENT WORTH of O&M COSTS WITH CONTINGENCY					$431,000	Assumes an interest factor of 7%

A. ...tive 3
Natural Attenuation
Evergreen Manor Site
Roscoe, Illinois

	ENGINEER'S ESTIMATES					COMMENTS
	Quantity	Unit	Unit Price	Cost	Subtotal	
SHALLOW GROUNDWATER SAMPLING						
QUARTERLY MONITORING FOR YEARS 1-2						
Rotosonic Subcontractor	4	lump sum	$22,448	$89,792		Cost includes labor, mobilization, decon, well materials, and drilling. 10 locations were assumed to be investigated. Each boring is assumed completed to 45', with groundwater samples being collected from 35' to 40' and 40' to 45'.
Labor	320	hour	$80	$25,600		Based on 2 people for 4 days (10 hours per day) at 3 borings per day per sampling event.
Per Diem	32	man days	$85	$2,720		Based on 2 people for 4 days per sampling event.
Equipment	4	lump sum	$350	$1,400		Cost includes equipment rental and expendable supplies.
Rental Vehicle	16	day	$80	$1,280		
ANALYTICAL						
VOC Analysis (water)	104	sample	$90	$9,360		Based on 20 investigative samples, 2 trip blanks, 2 equipment blanks and 2 duplicate samples per sampling event.
Shipping	16	shipment	$70	$1,120		
Reporting	4	each	$11,000	$44,000		
					$175,300	
ANNUAL O&M COST SUBTOTAL FOR YEARS 1-2					$175,300	
SUB-TOTAL of ANNUAL O&M COSTS WITH 25% CONTINGENCY FOR YEARS 1-2					$219,000	
QUARTERLY MONITORING FOR YEARS 3-7						
Rotosonic Subcontractor	4	lump sum	$8,979	$35,917		Cost includes labor, mobilization, decon, well materials, and drilling. 4 (40%) locations were assumed to be investigated. Each boring is assumed completed to 45', with groundwater samples being collected from 35-40' and 40-45'.
Labor	96	hour	$80	$7,680		Based on 2 people for 1 day at 12 hours per day for each sampling event.
Per Diem	8	day	$85	$680		Based on 2 people for 1 day per each sampling event.
Equipment	4	lump sum	$100	$400		Cost includes rental of various equipment, as well as some purchase items.
Rental Vehicle	4	day	$80	$320		
ANALYTICAL						
VOC Analysis (water)	44	sample	$90	$3,960		Assume 8 investigative samples, 1 trip blanks, 1 equipment blanks, and 1 duplicate sample per sampling event.
Shipping	4	shipment	$70	$280		
Reporting	4	each	$11,000	$44,000		
					$93,200	
ANNUAL O&M COST SUBTOTAL FOR YEARS 3-7					$93,000	
SUB-TOTAL of ANNUAL O&M COSTS WITH 25% CONTINGENCY FOR YEARS 3-7					$116,000	
PRESENT WORTH of O&M COSTS WITH CONTINGENCY					$811,000	Assumes an interest factor of 7%

Alternative 3
Natural Attenuation
Evergreen Manor Site
Roscoe, Illinois

	ENGINEER'S ESTIMATES					COMMENTS
	Quantity	Unit	Unit Price	Cost	Subtotal	
LONG-TERM AIR MONITORING PROGRAM						
QUARTERLY MONITORING FOR YEARS 1-2						
GEOPROBE SUBCONTRACTOR	4	lump sum	$12,646	$50,585		Cost includes subcontractor labor, mobilization, decon, and materials. Based on 25 homes with 4 borings (or soil gas samples) at each home per sampling event.
OVERSIGHT OF WORK						
Labor	800	hour	$80	$64,000		Based on 2 people for 10 days (10 hours per day) per sampling event
Per Diem	80	man days	$85	$6,800		Based on 2 people for 10 days per sampling event
Equipment	4	lump sum	$350	$4,400		Cost includes rental of various equipment, as well as some purchase items.
Rental Vehicle	40	day	$80	$3,200		2 vehicles per sampling event for air sampling canisters
ANALYTICAL						
VOC Analysis (air)	916	sample	$600	$549,600		Based on 175 investigative samples, 18 trip blanks, 18 equipment blanks, 18 duplicates
Shipping	228	shipment	$70	$15,960		Based on 4 sample containers per shipment
Reporting	4	each	$11,000	$44,000		
					$738,500	
ANNUAL O&M COST SUBTOTAL FOR YEARS 1-2					$738,500	
SUB-TOTAL of ANNUAL O&M COSTS WITH 25% CONTINGENCY FOR YEARS 1-2					$923,000	
QUARTERLY MONITORING FOR YEARS 3-7						
GEOPROBE SUBCONTRACTOR	4	lump sum	$7,377	$29,508		Cost includes subcontractor labor, mobilization, decon, and materials. Based on 10 homes with 4 borings (or soil gas samples) at each home
OVERSIGHT OF WORK						
Labor	320	hour	$80	$25,600		Based on 2 people for 4 days (10 hours per day)
Per Diem	32	man days	$85	$2,720		Based on 2 people for 4 days.
Equipment	4	lump sum	$540	$5,160		Cost includes rental of various equipment, as well as some purchase items.
Rental Vehicle	16	day	$80	$1,280		
ANALYTICAL						
VOC Analysis (air)	376	sample	$600	$225,600		Based on 70 investigative samples, 4 trip blanks, 10 equipment blanks, 10 duplicates per sampling event.
Shipping	96	shipment	$70	$6,720		Based on 4 sample containers per shipment
Reporting	4	each	$11,000	$44,000		
					$340,600	
ANNUAL O&M COST SUBTOTAL FOR YEARS 3-7					$341,000	
SUB-TOTAL of ANNUAL O&M COSTS WITH 25% CONTINGENCY FOR YEARS 3-7					$426,000	
PRESENT WORTH of O&M COSTS WITH CONTINGENCY					$3,194,000	Assumes an interest factor of 7%

A ative 3
Natural Attenuation
Evergreen Manor Site
Roscoe, Illinois

	ENGINEER'S ESTIMATES					COMMENTS
	Quantity	Unit	Unit Price	Cost	Subtotal	
SOIL SAMPLING						
QUARTERLY MONITORING FOR YEARS 1-2						
Labor	800	hour	$80	$64,000		Based on 2 people for 10 days (10 hour day) at 10 locations per day.
Per Diem	80	man days	$85	$6,800		Based on 2 people for 10 days.
Equipment	4	lump sum	$1,000	$1,000		Cost includes rental of various equipment, as well as some purchase items.
Rental Vehicle	40	day	$80	$3,200		
ANALYTICAL						
VOC Analysis (soil)	520	sample	$157	$81,640		Based on 100 investigative samples, 10 duplicates, 10 trip blanks, and 10 equipment blanks per sampling event.
Shipping	40	shipment	$70	$2,800		
Reporting	4	each	$11,000	$44,000		
					$203,400	
ANNUAL O&M COST SUBTOTAL FOR YEARS 1-2					$203,400	
SUB-TOTAL of ANNUAL O&M COSTS WITH 25% CONTINGENCY FOR YEARS 1-2					$254,000	
QUARTERLY MONITORING FOR YEARS 3-7						
Labor	800	hour	$80	$64,000		Based on 2 people for 4 days (10 hour day) at 10 locations per day.
Per Diem	32	man days	$85	$2,720		Based on 2 people for 4 days.
Equipment	4	lump sum	$400	$1,600		Cost includes rental of various equipment, as well as some purchase items.
Rental Vehicle	16	day	$80	$1,280		
ANALYTICAL						
VOC Analysis (soil)	208	sample	$157	$32,656		Based on 40 investigative samples, 4 duplicates, 4 trip blanks, and 4 equipment blanks per sampling event.
Shipping	16	shipment	$70	$1,120		
Reporting	4	each	$11,000	$44,000		
					$147,400	
ANNUAL O&M COST SUBTOTAL FOR YEARS 3-7					$147,000	
SUB-TOTAL of ANNUAL O&M COSTS WITH 25% CONTINGENCY FOR YEARS 3-7					$184,000	
PRESENT WORTH of O&M COSTS WITH CONTINGENCY					$1,118,000	Assumes an interest factor of 7%
SUB-TOTAL of DIRECT AND INDIRECT COSTS					$1,445,000	
SUB-TOTAL of DIRECT AND INDIRECT COSTS WITH 25% CONTINGENCY					$1,806,000	
PRESENT WORTH of O&M COSTS WITH CONTINGENCY					$6,759,000	
TOTAL COST (DIRECT COSTS + INDIRECT COSTS + PRESENT WORTH COSTS) WITH CONTINGENCY					$8,565,000	

APPENDIX J

State Letter of Concurrence

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

1021 NORTH GRAND AVENUE EAST, P.O. BOX 19276, SPRINGFIELD, ILLINOIS 62794-9276, 217-782-3397
JAMES R. THOMPSON CENTER, 100 WEST RANDOLPH, SUITE 11-300, CHICAGO, IL 60601, 312-814-6026

ROD R. BLAGOJEVICH, GOVERNOR RENEE CIPRIANO, DIRECTOR

217-524-1655

January 8, 2004

Ms. Wendy L. Carney
United States Environmental Protection Agency
77 West Jackson Boulevard
Mail Code S-5J
Chicago, Illinois 60604-3507

Re: 2010400015 – Winnebago County
Evergreen Manor Groundwater Contamination NPL Site
Superfund/Technical Reports

Dear Ms. Carney:

The purpose of this letter is to transmit the formal concurrence of the State of Illinois on the Record of Decision (ROD) for the Evergreen Manor Groundwater Contamination National Priorities List Site in Roscoe, Illinois.

If you should have any questions, need any additional information, or require any assistance regarding this matter, please contact me at 217-524-1655 or via electronic mail at: clarence.smith@epa.state.il.us.

Respectfully,

Clarence L. Smith, Manager
Federal Site Remediation Section
Division of Remediation Management
Bureau of Land

Attachment

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Evergreen Manor Groundwater Contamination National Priorities List Site
CERCLIS Identification Number ILD 984 836 734
Roscoe Township, Winnebago County, Illinois

STATEMENT OF BASIS AND PURPOSE

This decision document presents the United States Environmental Protection Agency's (U.S. EPA) selected remedy for the Evergreen Manor Groundwater Contamination site (Evergreen Manor site) in Roscoe Township in Winnebago County, Illinois. U.S. EPA developed this selected remedy in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA or Superfund). The selected remedy is also consistent with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), to the extent practicable. This decision is based on the Administrative Record file for this site.

The State of Illinois is concurring with U.S. EPA's selection of Alternative 3 - Monitored Natural Attenuation as the remedy for the Evergreen Manor site at this time. When U.S. EPA receives the state's letter of concurrence, it will be attached to the Record of Decision (ROD) as Appendix J.

ASSESSMENT OF THE SITE

The response action selected in this ROD is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

DESCRIPTION OF THE SELECTED REMEDY

This ROD addresses the remaining groundwater contamination at the Evergreen Manor site. In 1999 and 2000, U.S. EPA connected 281 homes with contaminated and threatened potable water supplies to the North Park Public Water District (NPPWD) as a Non-Time-Critical Removal Action. The NPPWD obtains most of its water from four wells located three to four miles south of the Evergreen Manor site. The wells are not in danger of becoming contaminated by the site. Contaminants have been found in two very deep standby wells (450 to 780 feet deep) operated by the NPPWD approximately 1320 feet (one-quarter mile) east of the site. Sampling indicates that this contamination is most likely coming from a contaminated coating found on the well pipes. At this time, U.S. EPA does not consider the contamination in the standby wells to be site related. The standby wells are not in use and the contamination is being addressed through U.S. EPA's Safe Drinking Water Program.

There may be as many as 73 private wells still in use in areas within or adjacent to the groundwater contamination. However, based on groundwater sampling from 1990 to 2002, U.S.

EPA expects that the private wells are not contaminated or have levels of contamination below drinking water standards.

This ROD addresses the remaining groundwater contamination at the Evergreen Manor site through the use of natural processes, local groundwater use controls and monitoring and contingency actions to eliminate or reduce the risks posed by the groundwater. This ROD also ensures that potential risks from site-related vapors remain below acceptable levels.

The major components of the selected remedy include:

- Natural attenuation to restore the groundwater to maximum contaminant levels (MCLs) and Illinois Primary Drinking Water Standards (35 Ill. Adm. Code Part 611) for trichloroethene (TCE), tetrachloroethene (PCE) and other site-related chemicals. Based on U.S. EPA's investigations, the following chemicals may also be site-related and may be present in the groundwater above risk-based levels: benzene, ethyl benzene, toluene, xylenes, acetone, methylene chloride, Freon 113 (1,1,2-trichloro-1, 2,2-trifluoroethane), 2-butanone (methylethylketone), 1,1,1-trichloroethane, cis-1, 2-dichloroethene and other breakdown products of TCE and PCE. Based on the potential for exposure to multiple contaminants in the groundwater, the total excess lifetime cancer risks from exposure to groundwater will also be reduced to 1×10^{-4} or less for carcinogenic risks and a hazard index of less than 1.0 for non-cancer risks. The primary attenuation processes at the Evergreen Manor site are stream capture and dilution, with dispersion, advection and some biodegradation occurring within the plume. The estimated cleanup timeframe is approximately 15 years. As the levels of contaminants in the groundwater decrease, any site-related contaminants in the soil vapors and in area homes are also expected to decrease.

- Local government controls to limit the use of contaminated groundwater as a water supply until the cleanup is complete. Winnebago County has two ordinances that accomplish this (Winnebago County Code Article III, November 1999). Section 86-111 of the code requires all properties within 200 feet of a public water supply to connect to the water supply instead of drilling a well. The areas where groundwater contaminants are still above drinking water standards are serviced by the North Park water supply, so the U.S. EPA does not expect any new wells to be permitted in these areas. In areas where municipal water is not available and where it is uncertain whether groundwater contaminants are still above drinking water levels, Section 86-114 of the code applies. This section of the code requires property owners to obtain a well permit for a new well or for well repairs. On the permit, the County can notify the applicant that the well is located in a contaminated area and can recommend that the well be sampled for contaminants. If contaminants are detected, the county can recommend that a home treatment unit be installed. The County can also recommend that new and redrilled wells

be installed below the zone of contamination so that only clean water comes into the wells; and can notify U.S. EPA when a new permit is issued in the area.

- Groundwater and residential well monitoring to track the progress of natural attenuation over time and to verify that the remedy remains protective of human health and the environment until the cleanup levels are attained. The monitoring will also verify that the contaminated groundwater discharging to the Rock River will not result in exceedences of surface water. The monitoring program will identify any changes in land and groundwater use and changes in groundwater conditions that could affect the performance or the protectiveness of the remedy.

- Vapor monitoring at a statistically significant number of homes (approximately 25 homes) throughout the area four times a year (winter, spring, summer and fall) to verify that potential risks from site-related vapors remain below a total excess lifetime cancer risk of 1×10^{-4} and a non-cancer hazard index of 1.0. Vapor monitoring will be conducted over a one- to two-year period. After the first year, the results of the sampling will be reviewed and the monitoring program may be modified to add or remove homes from the program. It is anticipated that vapor monitoring will include soil gas, indoor air, soil and shallow groundwater sampling. Vapor monitoring will continue until it is clear that site-related soil vapors will remain below acceptable levels.

Contingency actions will be implemented if monitoring identifies the need for modifications or changes in the remedy. Contingency actions include: Confirmation sampling; collecting samples more frequently; contaminant fate and transport modeling; human health and ecological risk assessment; collecting surface water and/or sediment samples from the Rock River; temporary well point sampling, vertical profiling or other characterization activities; installing new monitoring wells; adding locations to the vapor monitoring program or modifying the vapor monitoring program; adding private wells to the groundwater monitoring program; notifying the Winnebago County Health Department of changes in the extent of the contaminated groundwater plume and of changes in chemical concentrations within the plume; installing venting systems at homes where site-related vapors do not remain below acceptable levels; conducting a source area investigation; evaluating whether additional response actions, such as constructing a groundwater pump and treat system, installing treatment units at individual private wells, connecting additional homes to the NPPWD, or remediating source area(s) are necessary; and implementing additional response actions.

ROD DATA CERTIFICATION CHECKLIST

The Decision Summary section of this ROD includes the following information:

- Chemicals of concern and their respective concentrations.

- Baseline risks represented by the chemicals of concern.

- Cleanup levels established for chemicals of concern and the basis for the levels.

- Current and reasonably anticipated future land and groundwater use assumptions used in the baseline risk assessment and streamlined risk evaluations.

- Industrial sources of the groundwater contamination that were addressed under State oversight or private actions.

- Land and groundwater use that will be available at the site as a result of the selected remedy.

- Estimated capital, annual operation and maintenance (O&M), and total present worth costs; discount rate; and the number of years over which the remedy cost estimates are projected

- Key factors that led to selecting the remedy (i.e., describes how the selected remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria, and highlights criteria key to the decision).

Additional information may be found in the Administrative Record file for this site.

STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action and is cost effective. The selected remedy utilizes permanent solutions and alternative treatment or resource recovery technologies to the maximum extent practicable.
The selected remedy does not satisfy the statutory preference for treatment as a principal element of the remedy. This ROD addresses a large area of remaining low-level groundwater contamination from industrial sources that were addressed under state oversight and private actions from the 1970s to the 1990s. The generally low levels of contaminants found in the industrial area and the significant decreases in groundwater concentrations from 1990 to 2002 indicate that the sources of the groundwater contamination have been addressed and that no further action is needed to investigate and/or address these source areas at this time.

Because this remedy will result in hazardous substances remaining in the groundwater above levels that allow for unlimited use and unrestricted exposure, U.S. EPA will conduct a review

within five years after the initiation of the remedial action to ensure that the remedy continues to provide adequate protection to human health and the environment.

U.S. EPA has determined that its future response at this site does not require physical construction. U.S. EPA will prepare a Preliminary Close-Out Report and the site will qualify for inclusion on the Construction Completion List.

AUTHORIZING SIGNATURE

Renee Cipriano, Director
Illinois Environnemental Protection Agency

12/23/03
Date

APPENDIX K

Recalculated Risks Using Updated Toxicity Values for TCE and PCE and 2002 Groundwater Data

RECALCULATED CANCER RISKS FOR ADULT EXPOSURE TO GROUNDWATER
USING REASONABLE MAXIMUM EXPOSURE ASSUMPTIONS IN 2001 RISK ASSESSMENT
(SEE SECTION 9 AND APPENDIX A IN 2001 RI REPORT), WITH REVISED TOXICITY VALUES
FOR TCE AND PCE AND 2002 GROUNDWATER DATA

September 2003

INGESTION RISK = [(CW x IR x EF x ED)/(BW x AT)] x CSF-O

	CW	IR	EF	ED	BW	AT	CDI	CSF-O	RISK
2002									
TCE	0.0072	2	350	24	70	25550	6.76E-005	4.1E-001	2.77E-005
PCE	0.0059	2	350	24	70	25550	5.54E-005	5.4E-001	2.99E-005

DERMAL RISK = [(CW x SA x PC x ET x EF x ED x CF)/(BW x AT)] x CSF-D

	CW	SA	PC	ET	EF	ED	CF	BW	AT	CDI	CSF-D	RISK
2002												
TCE	0.0072	23000	1.6E-002	0.75	350	24	0.001	70	25550	9.3E-006	4.1E-001	3.8E-006
PCE	0.0059	23000	4.8E-002	0.75	350	24	0.001	70	25550	2.3E-005	5.4E-001	1.2E-005

INHALATION RISK = [(CW x VF x IR-A x EF x ED)/(BW x AT)] x SF-INH

	CW	VF	IR-A	EF	ED	BW	AT	CDI	SF-INH	RISK
2002										
TCE	0.0072	5.00E-001	15	350	24	70	25550	2.54E-004	4.1E-001	1.04E-004
PCE	0.0059	5.00E-001	15	350	24	70	25550	2.08E-004	0.02065	4.29E-006

NOTE: FOR 2000 DATA, SF-INH = (UNIT RISK) x (70 kg) / (20 m3/day) / (10-3)

TCE = (1.7x10-6 unit risk) x (70) / (20) / (10-3) = (1.7x10-6) x (70) / (20) / (10-3) = 5.95 x 10-3
PCE = (5.7x10-7 unit risk) x (70) / (20) / (10-3) = (5.7 x 10-7) x (70) / (20) / (10-3) = 2 x 10-3

NOTE: FOR 2002 DATA, SF-INH FOR TCE IS SF-ORAL PER TCE EXTERNAL REVIEW DOCUMENT
PCE SF-INH = (5.9x10-6 unit risk) x (70) / (20) / (10-3) = (5.9x10-6) x (70) / (20) / (10-3) = 0.02065

TOTAL 2002 RISK ALL PATHWAYS TCE AND PCE = 0.0001817